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Contractors *and* Engineers Monthly

Vol. 43, No. 12

DECEMBER, 1946

\$3 a Year, 25 Cents a Copy

Covering the Field

RR and Road Grading

The two grading contracts involved in a 3,750,000-yard 16.6-mile Northern Pacific Railway line change across rough North Dakota terrain are described on this page. Feature of the dual-highway-grading story told on page 26 was the installation of over 3,000 feet of drainage pipe.

Bituminous Paving

An article on page 1 tells how 15 miles of old concrete road were given a bituminous-mat overlay, for about \$3,800 per mile.

Read on page 29 how 2½ miles were improved with a bituminous-macadam pavement which was laid on a foundation course of gravel sub-base 12 to 24 inches thick.

Paving Airport Runways

Over 1,000,000 yards of gravel foundation was hauled to Logan International Airport on one of the two contracts to build permanent runways of bituminous concrete. See page 2, and 40 and 41 for pictures.

Channel Dredging

The dredging job recounted on page 6 both stabilized a sea channel and restored an eroded beach section with hydraulic fill.

Timber-Concrete Bridge

Turn to page 11 for the job report on a \$22,974 four-span composite structure which was built on treated-timber piles.

Concrete Pumped to Building

The account on page 17 of Pumpcrete for a reinforced-concrete building includes practical suggestions on how to plan a concrete-pumping job and on the mix design.

Laying New Sewer Line

A 500-foot section of cast-iron sewer pipe weighing 116 tons was floated out and sunk into place in the river by the City of Jacksonville, Fla. See page 33.

Safety in Blasting

Some helpful and specific rules to follow for safeguarding men in the working area are to be found on page 36.

Highway Maintenance

In California, maintenance machines are rented to district crews and repaired for them by the Equipment Department. This system as well as a typical shop are described on page 46.

How a 2-mile stretch of worn concrete highway was covered by a cold-mix bituminous surfacing is told on page 59.

Work Starts for New Dam

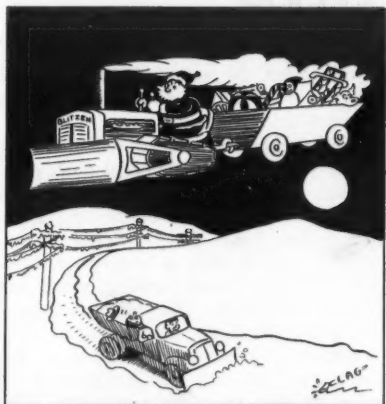
Drilling a diversion tunnel in rock, as told on page 50, was a preliminary step on the projected new earth dam to control floods on the Connecticut River.

County Road Work

The snow-removal problems, preparations, and procedures of a Minnesota county receive attention on page 56.

Concrete Paving

An article on page 62 tells how a contractor handled two contracts for widening and resurfacing two sections of dual highway with both concrete and hot-mix. (You will find "In This Issue" on page 4)



Bituminous Mat Laid on Old Road

Contract to Widen and Resurface 15 Miles of Heavily Traveled Old Road Cost Only \$3,800 a Mile

AN old concrete highway, inadequate both in width and in surfacing, was reclaimed and brought to improved standards last summer in southern Minnesota by an overlay mat of bituminous mix. On this project, over 15 miles of bituminous mat 20 feet wide was laid in 23 working days at a cost of approximately \$3,800 per mile.

Southern Minnesota is dotted with busy little cities between which traffic is extremely heavy. Two such cities are Northfield and Faribault on Trunk Highway 65. Moreover, the same highway is also one of the main traffic-ways from the south to the Twin Cities. The old concrete slab, which for years has been pounded by commercial and pri-

(Continued on page 13)

A 3,750,000-Yard Dirt Job For Railroad Line Change

By RAYMOND P. DAY
Western Field Editor

ALMONT, N. Dak., is a little-known agricultural settlement with unpaved streets and a post office which needs paint. Wheat is Almont's lifeblood—golden grain pulsing through the arteries of a great state towards the towering elevators along the railroad. The elevators are new and modern. They are the heart of Almont's existence.

In a way, they have contributed to an earth-moving job so staggering in its magnitude that the best civil engineers of the Northern Pacific Railway mulled it over for 45 years. Now the job is completed. The railroad is leaving Almont. A new rail bed has been built across 13.6 miles of North Dakota's roughest terrain.

Between 1892 and 1945 no less than thirteen surveys were run to locate a shorter route through the glaciated hills. And when the final site was decided on in 1945, it still involved moving 3,750,000 cubic yards of dirt, and building fills in some places 60 feet high.

The old roadbed between the connection west of Kurtz and New Salem was 25.9 miles long and made a long loop through Almont. Grades ran up to 1 per cent and trains negotiated 607 degrees of curvature in making the run. With the advent of new diesel trains, the line change was more than justified. The new line will reduce total curvature to 109 degrees and ease maximum grades to 0.6 per cent on the westbound track. The trains which move towards

Northern Pacific Awards Two Large Contracts for Realignment Considered 45 Years Ago

the east with their tonnage will not have to climb anything steeper than 0.45 per cent grade.

The west half of the new roadbed was started April 1, 1946, by A. Guthrie Co., Inc., of St. Paul. The \$645,000 contract consisted principally of 2,250,000 cubic yards of excavation and fill, and was scheduled for completion by October 1.

Excavation and Fill

A. Guthrie Co., Inc., established a job office at Glenullen, N. Dak., near the western end of the job. U. S. Highway 10, which runs generally parallel to the new railroad bed, furnished access at many points to the different locations for the heavy excavating equipment.

Since the job posed such dirt-moving problems as long hauls, tough digging in lignite and scoria seams, and wet conditions in clay pockets, quite an impressive list of equipment was necessary. Six Super C Tournapulls and three 8-cubic-yard Tournapulls were brought in for the longer hauls. Six Caterpillar D8 tractors with LeTourneau and Gar Wood 25-cubic-yard earth-moving scrapers were also brought in, with six Caterpillar and International pusher tractors. Two Caterpillar No. 12 motor graders and two Caterpillar-D8-mounted bulldozers completed the list of tractor equipment. Two sheep-foot rollers were also brought in to the job.

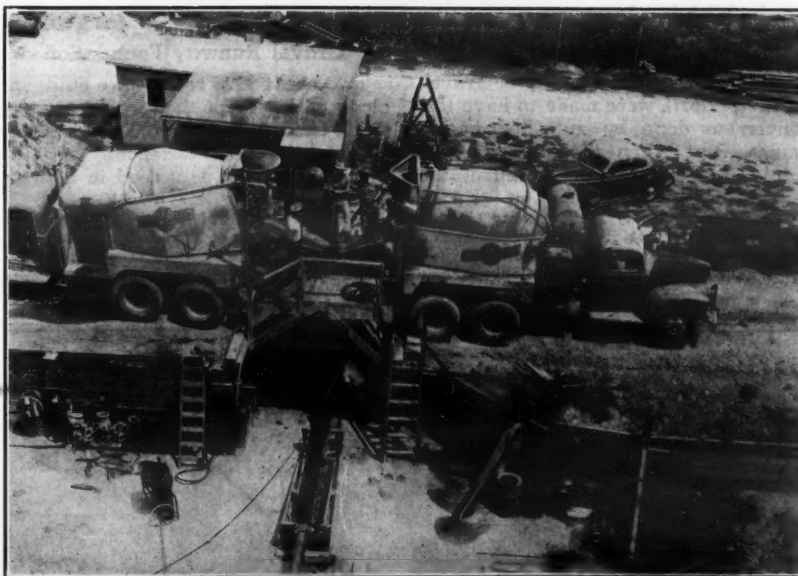
Despite the fact that a railroad fill is subject to shake as well as shear stress, no special emphasis was placed on controlled compaction. The railroad fill was such that long stretches would be compacted by the passage of rubber-tired scrapers and Tournapulls. Lifts were held down to 10 inches in thickness.

There was one item, however, on which the Northern Pacific Railway specifications were rigid. That was the matter of lignite. North Dakota, between New Salem and Kurtz, is full of seams of lignite coal. In ages past these coal seams have ignited, to some extent, and the clay overburden just above the coal seams has burned into a hard vitrified formation called scoria, which resembles tile. Obviously it would not do to incorporate coal pockets in any kind of fill, for these pockets might well ignite due to spontaneous combustion and create voids in the fill.

As lignite was found, therefore, it was dug out and wasted. Sometimes the machines wasted it along the railroad

(Continued on page 75)

CONCRETE FOR BUILDING IS PUMPED IN PLACE



The 15,000 cubic yards of concrete for the new May Co. store in Los Angeles is being placed by the Pumpcrete method. Truck-mixers deliver the concrete to the hopper of the Pumpcrete from which it passes through an 8-inch line, which has a maximum horizontal length of 475 feet and 70 feet of vertical run. See page 17.

Permanent Runways Of Bituminous Concrete Are Built at Airport

**Haul Over 1,000,000 Yards
Of Gravel as Foundation
For Flexible Pavement;
Two Contractors Do Job**

By WILLIAM H. QUIRK, Editor
and Eastern Field Editor

(Photos on pages 40 and 41)

† TWO big New England contracting firms are nearing the completion of their respective contracts which will give the East Boston, Mass., Airport two 7,000-foot permanent runways of flexible-type construction. They are M. DeMatteo Construction Co. of Quincy, Mass., and B. Perini & Sons of Framingham, Mass. Work on the two contracts, totaling over \$3,500,000, started this spring. It is scheduled for completion in December, according to the Massachusetts Department of Public Works, which is directing the construction of this huge new Logan International Airport located in Boston harbor. (See C. & E. M. Dec., 1944, pg. 2.) During this construction of permanent runways A and B, air traffic at the field went on as usual; planes landed and took off from three temporary runways which were completed in April of this year. (See C. & E. M. July, 1946, pg. 9.)

A feature of the DeMatteo contract was about 1,100,000 cubic yards of gravel hauled to the airport from pits 17 miles away in trucks which, at the peak of the job, totaled 650. This gravel was leveled and compacted to serve as a foundation for the flexible-type bituminous-concrete pavement which was included in the Perini contract. Both contracts also included work on the 7,000-foot runway C in order to make it available this past summer for temporary duty. It will be improved at a later date with permanent-type construction similar to that on A and B, the long new runways.

Long Gravel Haul

The East Boston Airport is built on blue clay pumped from the harbor bottom. The level of this clay purposely was left low so that a foundation of gravel could be laid for the runways. Although in some low areas a depth of 7 to 8 feet was required, an average of 4 feet of gravel was spread over the full 300-foot runway width. The DeMatteo Construction Co. obtained the material for this great fill from twelve different gravel pits located in the towns of Peabody and Middleton to the north of Boston. Not long after this contract got under way in March, trucks were hauling gravel to the airport at the rate of 7,000 yards in an 8-hour day. Within a month a peak of 18,000 yards a day

was reached by using 650 trucks and by working two shifts on the 17-mile average haul. Such concentration of equipment and effort soon brought this phase of the work to a point where it was three months ahead of schedule. The number of trucks was therefore decreased to around 200 which averaged about 8,000 yards of gravel for a single shift.

The haul trucks were of all types and sizes carrying anywhere from 8 to 20 tons per load; the large units were of the semi-trailer dump type. The contractor used around 50 from his own fleet of Sterlings and Internationals, but the rest were all hired on a ton-mile basis. Many of these hired trucks were owned by veterans who bought them from Army surplus stock with G.I. loans. These owner-drivers were attracted to the airport from all parts of New England.

For this project the contractor added about 60 new trucks to his equipment, most of them purchased from Government surplus supplies. Many of these units were cargo carriers and not adapt-



C. & E. M. Photo
To obtain fill for runway shoulders, M. DeMatteo Construction Co. used Northwest shovels to load bottom-dump Euclids with hard clay till from Governors Island.

change-over, the work was done in the contractor's Quincy shop at the rate of two trucks a day.

At the pits the trucks were loaded by 1½-yard shovels which at peak production numbered seven: five Lorains, a Link-Belt, and a Northwest. They then rolled down the highways to the airport almost like a conveyor belt. The excavation and hauling were not without incident. The big lumbering trucks played havoc with normal passenger-car traffic, and the noise of the shovels in the pits was displeasing to many of the near-by residents. The contractor was beset with the difficulties of avoiding injunctions slapped on by

course 3 to 3½ feet thick, while additional gravel was spread in 6-inch courses. For spreading and leveling the dumped piles of gravel, the contractor picked equipment from his fleet of 10 Caterpillar tractor-dozers; 5 D8's, 4 D7's, and an RD6; and 4 power graders—3 Galions and 1 Caterpillar. Each course of newly dumped gravel was compacted by four passes from the heavier D8 or D7 tractors. In this contract the gravel was brought up to an elevation within 1½ feet of the finished runway grade.

The contract stipulated that the top foot of gravel foundation meet the standard specifications for gravel sub-base. The gradation requirements for this gravel are:

Sieve Size	Per Cent Passing
½-inch	70
No. 4	50
No. 200	5

For gravel borrow used as granular fill below the top 12-inch layer, the contract special provisions permitted the use of material conforming to the following gradation:

Sieve Size	Per Cent Passing
½-inch	100
No. 4	75
No. 200	5

When necessary the gravel was wet down on the fill by spraying it with water from a 1,000-gallon tank mounted on a Mack truck. During the night operations the dumping area was lighted by ten Kohler 5-kw light plants.

In addition to this preliminary work on the permanent runways, the DeMatteo contract included preparing runway C for temporary use. It was brought up to grade, and 3,000 feet of gravel top course was surface-treated with T-3 tar followed by a seal of T-6 tar. A landing strip at the south end of the runway, 1,000 feet long x 150 feet wide, was then paved with a 2-inch course of bituminous concrete. To grade the runway and level some surplus spoil areas, five draglines worked on wooden mats. These included three Speedcranes and two Koehrings with 60-foot booms and Hendrix buckets of either 1¼ or 1½-yard capacity.

The remaining 4,000 feet of this runway had been included in the earlier Perini contract, in which asphalt was

(Continued on page 68)



C. & E. M. Photo
An Osgood 200 ½-yard shovel loads a Dodge truck with crushed stone for runway base course which is part of the B. Perini & Sons contract.

ed for end-dumping. The International 3-axle drives were, however, outfitted with a 2-way winch in front, operating from the power take-off in back of the transmission. By cutting 2 feet off the rear of the chassis to facilitate dumping, and by constructing an A-frame directly behind the cab, the contractor converted these cargo trucks to dump trucks. Sheaves were placed at the peak of the A-frame and beneath the chassis, and a 5/8-inch cable passed through them to connect with the front winch. With this ingenious rigging, the 7½-yard body was easily lowered and raised to provide a truck capable of hauling from 12 to 14 tons of gravel. At first, efforts were made to have this conversion done by auto-body companies. But when they said that it would take six months to effect the

local communities to restrain him in his work; the truck drivers had their troubles in getting through towns and villages without violating some ordinance and being penalized by fines.

At the airport the trucks and contents were weighed on Fairbanks-Morse beam scales. Two weigh houses were provided to speed the truck movements. The tonnage figure, on which basis the haulers were paid, was then converted into yards, since the contractor was paid for gravel on this unit of measurement.

Gravel Runway Foundation

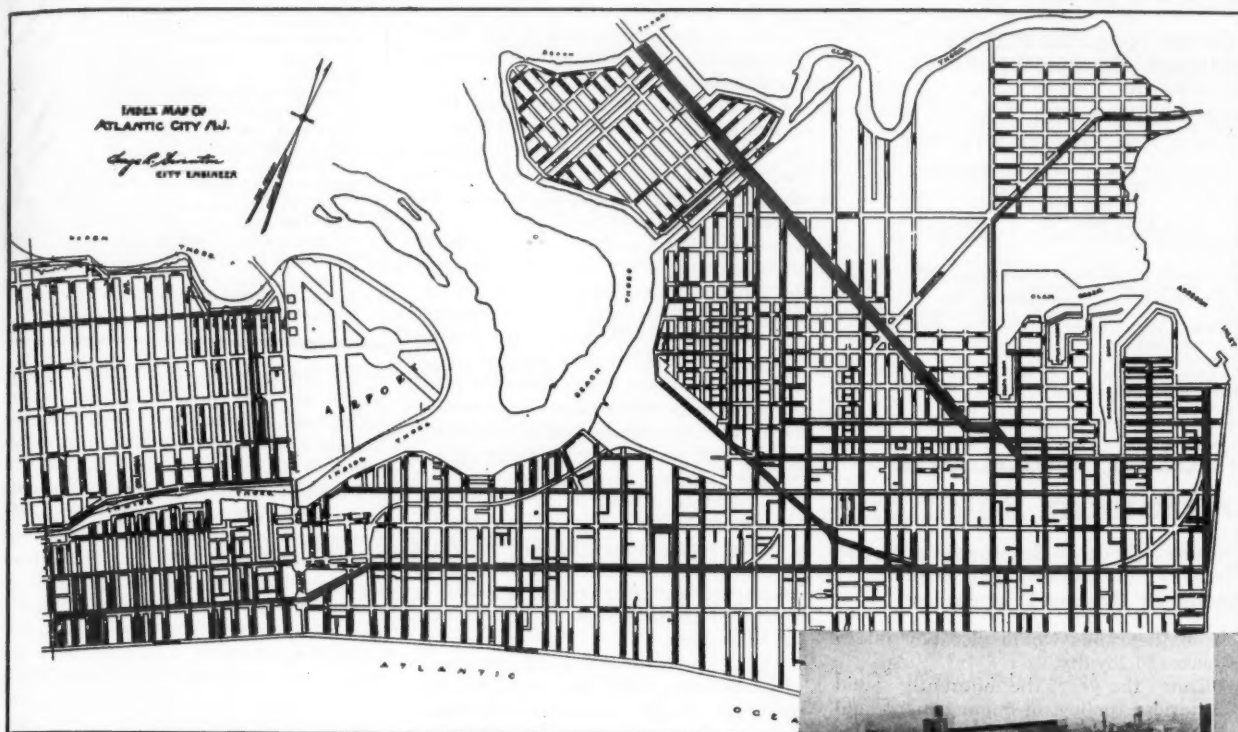
Two new access roads were built, one along each side of the airport, to keep truck traffic rolling in and out and also shorten the haul distance. The first layer of gravel was spread in a single

A Lorain crane (left) loaded stone into a 75-ton bin at the new Gummer asphalt plant which turned out hot-mix for permanent-runway paving at the East Boston, Mass., Airport. An 80-foot pipe (center) ran from the drier to an old destroyer smoke stack converted into a dust collector. Frank McCourt, Jr., and James Durkan (right) were Superintendents for John McCourt Co. of Boston, paving subcontractor.

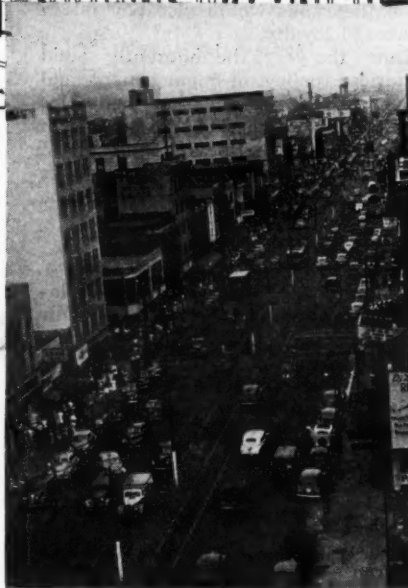
C. & E. M. Photos



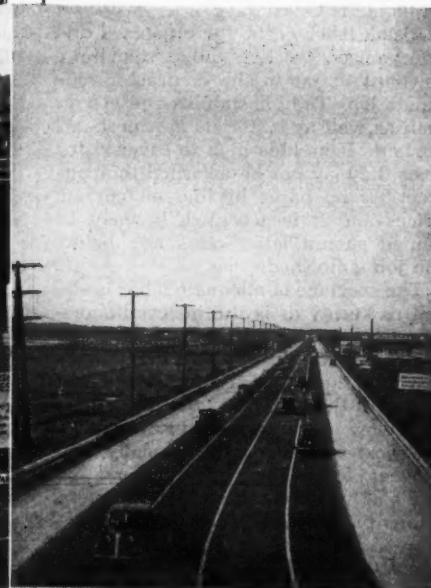
88% of ATLANTIC CITY'S paved streets are Texaco



Street map of Atlantic City, N. J., on which streets paved with Texaco Asphalt are indicated in red.



Atlantic City's principal thoroughfare, Atlantic Avenue, has a plant-mixed Texaco Asphalt pavement.



Traffic flows into and out of Atlantic City over the resilient Texaco Asphalt pavement on Absecon Blvd.



DEPARTMENT OF Public Works ATLANTIC CITY, N. J.

MAJOR WILLIAM F. CASEY, COMMISSIONER
July 16, 1946.

The Texas Company
Asphalt Sales Department
135 East 42nd Street
New York City 7

Gentlemen:

This is in answer to your inquiry regarding Atlantic City's experience with Texaco Asphalt paving.

We paved a number of our streets with your asphalt in 1913. As a result of the performance of those early pavements, from the standpoint of durability and maintenance cost, we have added to the original yard- and maintenance cost, up to and including 1946. At the present time, approximately 88 percent of the hard-surfaced streets in Atlantic City are paved with Texaco Asphalt construction of the plant-mixed type. This includes our most heavily travelled thoroughfares, such as Atlantic Avenue and Absecon Boulevard. All of this paving has given satisfactory service.

Atlantic City is visited each year by approximately 12,000,000 people from all parts of the United States. Most of these visitors come by automobile, which gives some idea of the volume of traffic our streets are called upon to serve, particularly during the summer months.

Very truly yours,

MAJOR WM. F. CASEY
COMMISSIONER.

WFC
FLA

12,000,000 visitors flock to Atlantic City, N.J., every year, attracted by its famous boardwalk, bathing beaches and hotels.

Less conspicuous to the average visitor, but performing an essential service, are the resort's well-paved streets.

Commissioner William F. Casey supplies some interesting facts concerning Atlantic City's paving in the letter at the left. For example, the resort has been constructing resilient, heavy-duty Texaco Asphalt pavements on its streets for 33 years. A glance at the above map of the city's street system reveals at a glance the extent to which it is Texaco-paved. Approximately 88 percent of all hard-surface paving in Atlantic City is Texaco Asphalt construction of the plant-mixed type.

Texaco Asphaltic products have served America's road builders for 40 years. . . . Texaco Engineers, who are Asphalt specialists, are at your service.

THE TEXAS COMPANY, Asphalt Sales Dept., 135 East 42nd St., New York City

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TEXACO ASPHALT

Contractors and Engineers Monthly

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Better Management-Labor Relations Result From Better Human Relations

One of the Most Vital Problems in Industry Today—Employer-Employee Relations—Is Discussed by Our Three Field Editors Who Present Their Observations and Suggestions for Greater Cooperation

William H. Quirk says:

Rising labor costs, for organized and unorganized workers alike, remain a constant threat to the contractor bidding a job. To him, stabilized prices for men as well as materials are most important. If he bids high to cover rising costs, he may not be awarded the contract. If he bases his bid on current prices and it is accepted, he may be ruined should labor costs rise before the job is finished.

The shortage of adequate labor is still felt as keenly as is the material shortage, despite the return of millions from the armed forces. Jobs worry along on less than the required number of workers, with the quality of the labor often far below par. Too sadly in evidence is the post-war tendency of many employees, former war workers and ex-G.I.'s as well, to continue the wasteful habits practiced in an economy of total war. As most war construction was on a cost-plus basis, and as the services are not especially known for frugality with men or money when they are building anything, workers were well paid without having to extend themselves, and the contractors didn't have to take production losses. But in normal times of construction, the highly competitive bidding must be based on a full day's work if the job is not to finish in the red.

Labor cannot be altogether blamed for its laissez-faire attitude and indifference to an employer's profit or loss. The frightful waste of war, both on the battlefronts and in industry, has developed a mass apathy towards the old virtue of producing a full day's work for a full day's pay. And mass thinking cannot reverse itself over night. Labor, moreover, is resentful of those who toiled not but yet amassed great fortunes from war at the expense of the taxpayers.

Time, the great healer, will bring improvement to the relationship between management and labor. Both factions are already sobering up after the emotional spree of war, and are slowly realizing that the victor as well as the vanquished must pay for the destruction and waste of goods and resources. But time must be helped.

Labor must acknowledge that wage increases do not help when costs rise correspondingly. It must realize that if it does not turn in a day's work, the contractor not only will lose money but will be unable to provide any work at all. Management, on the other hand, could furnish an incentive to labor by more widespread use of the bonus to reward effort over and above the norm. Training its workers and upgrading

from the ranks would also pay off in increased loyalty.

Down the years the inherently sound American policy of management and labor working together has made this country what it is. The raw spots in their relations, an inevitable result of the cataclysm through which we have passed, are healing, but it takes time and cooperation.

Raymond P. Day says:

Indifferent labor is unproductive labor. It is variously estimated by highway-department heads, Government bureau chiefs, and construction superintendents that a construction worker today is only about 60 to 75 per cent as efficient as he was in 1938-39. This decrease in men's efficiency undoubtedly results from their loss of incentive. Why the loss? The reasons are really sociological.

For example, consider the plight of itinerant construction workers today. About 85 per cent of them are earning less than \$75 a week. It is practically impossible for them to find a place to live in the locality of their job. The buying power of their dollar has diminished alarmingly. In a day when security is a widely discussed subject, there is no security for them. Family and stockholder relationships in many of the larger construction, companies and syndicates make advancement diffi-

cult for them, if not impossible. Governmental restrictions, paper work, and so-called "planning" have taken responsibility away from the field men on the job. The result is an indifferent, sullen, resentful worker who labors only for Saturday night and payday.

Both management and labor have been missing the crux of the solution. Management in the construction industry, as in all other industry, must recognize and alleviate these problems of its workers. And labor must realize that the best way to obtain the concessions it wants from management is by increased man-hour production.

How can these ends be accomplished? Management could make every man on the job feel a real part of that job by delegating more responsibility to him, and then by intelligently supervising his work. Management's careful planning could mean for employees such things as promotion based on merit; a more humane and helpful attitude towards families bereaved because of accidents; perhaps a party on each job for all men, great and small. That good old custom of "topping out" a job with a party needs renewing. It not only provides the workers with a chance for relaxation and fun, but also with a feeling of achievement and pride in a job well done.

These suggestions are not impossible to carry out. This past summer, one contractor in the west solved his workers' housing problems by operating bunk wagons and a cook house. He took a \$50-a-day loss, but that loss reduced his labor turnover to almost nothing. It increased the buying power of his workmen's dollars. It fed and housed them well. And, as the camp was 5 miles from the nearest town, it equally reduced absenteeism. Moreover, the contractor's superintendent on this job was really interested in his men, and they instinctively responded. Occasional informal bull sessions in the evening kept their attention and concern focused on their work. All in all, the increased production of machines operated by interested men paid the \$50 cook-house "loss" over and over again.

This is not currying favor with labor—it is being a friend to labor. Good will is nothing but a succession of good impressions. Get the good will of the people who work for you, and the result is highly profitable and satisfying.

Howard V. Pehrson says:

When anyone speaks of labor relations in the construction industry these days, he puts it "labored relations". As one contractor said:

"The only thing collective about collective bargaining is all getting together

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in the same room. As far as the employer is concerned, there isn't much he can say. He just can't argue or even discuss a matter with someone who has a gun in his ribs."

During less than a quarter of a century, the construction industry has seen the labor-management seasaw tilt from one extreme to the other. When management had matters pretty much its own way, there were a lot of abuses and complaints. Now that labor and the unions control matters, there are still a lot of abuses and complaints.

Two of the most commonly met complaints concerning labor are: (1) wage demands are not consistent with the individual's productive capacity; (2) there is nothing fair or just in union wage scales which set the rate of payment for everyone at the productive level of the lowest skilled worker. But labor points out that construction is seasonal and hazardous. It complains of the lack of pension or retirement provisions and of bonus incentives. It says, in effect, small wonder that our attitude has become one of getting while the getting is good. Management might well consider these complaints. If private construction firms do not, they are likely to find themselves bidding higher and higher for skilled workers.

Highway departments are also faced with a labor problem. In this case, employees are lured away by the higher wages in other industries, and by the various advantages of steady employment, pension plans, etc. Many highway departments are giving serious thought to ways of improving their own employment picture and of guaranteeing a continuity of skilled workers who otherwise would be tempted to accept private employment.

One county highway department a few years ago inaugurated a highly successful labor-relations plan. Its features are a cost-of-living bonus adjusted to current prices; guaranteed year-round employment with pensioned retirement; and guaranteed rate of pay at highest skill regardless of the type of work being done. Another midwest county follows a similar plan which includes such benefits as sick leave, hospitalization, and year-round employment on the basis of 40 hours of work a week. The yearly employment basis has the advantage of permitting as much overtime as may be necessary during the busy seasons, with compensating time off during slack seasons. Thus, both the county and its employees always know where they stand as far as the payroll is concerned.

Contractors would do well to consider some of these features. While it might not be feasible to extend such benefits to all employees, certainly key men in the organization and workers whose production is known to be high should be included.

On the other side of the picture, labor is going to have to adopt a more cooperative attitude and get back on a production basis. Otherwise it stands to lose much that it has gained through sincere and honest effort.

WE'RE DREAMING OF A DOUBLE CHRISTMAS!

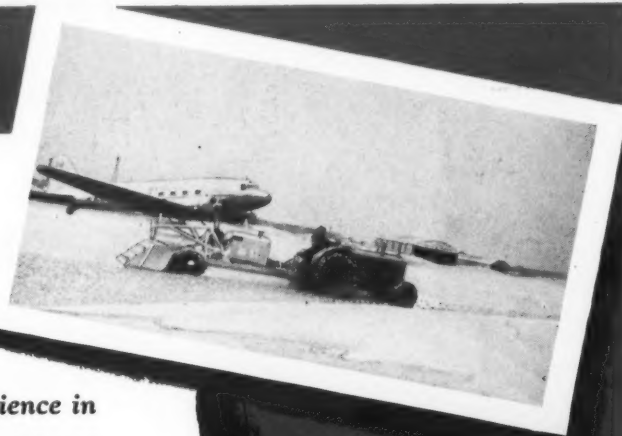


AN EVALUATION OF THE SEAMAN MIXER IN ALLEVIATING HAZARDOUS ICE AND SNOW CONDITIONS ON PUBLIC THOROUGHFARES AND AIRFIELD RUNWAYS



Five winters of experience in the use of the SEAMAN MIXER, equipped with a special ice rotor in meeting several phases of problems brought about by ice and snow, indicate that its value may come within the following applications and limitations:

- 1 For the fragmentation of ice of 1/2" to 3" thickness on paved surfaces,—to facilitate removal. If, however, frozen within the ice-slab are considerable quantities of straw,—gravel or similar material,—fragmentation is impossible and the ice must be pulverized in successive passes with the SEAMAN MIXER in which the machine has chiefly a grinding function.
- 2 Where traffic has created dangerous ruts in ice-covered thoroughfares,—the SEAMAN MIXER will effectively grind the ice surface down to the rut base,—thus producing a level area.
- 3 Where excessively slippery iced areas are encountered, the SEAMAN MIXER may be used to roughen the surface,—which in turn will make more effective the action of sand or other traction-increasing material which may subsequently be applied.
- 4 Where hard, compacted, frozen snow drifts create a hazard, the SEAMAN MIXER will penetrate and pulverize the mass to dissipate it or facilitate removal.
- 5 To pulverize rough, compacted snow on airfields to permit mechanical recompaction to form a level safe snow runway.



After snow is pulverized with the SEAMAN it can be compacted to form safe, smooth, hard runways.

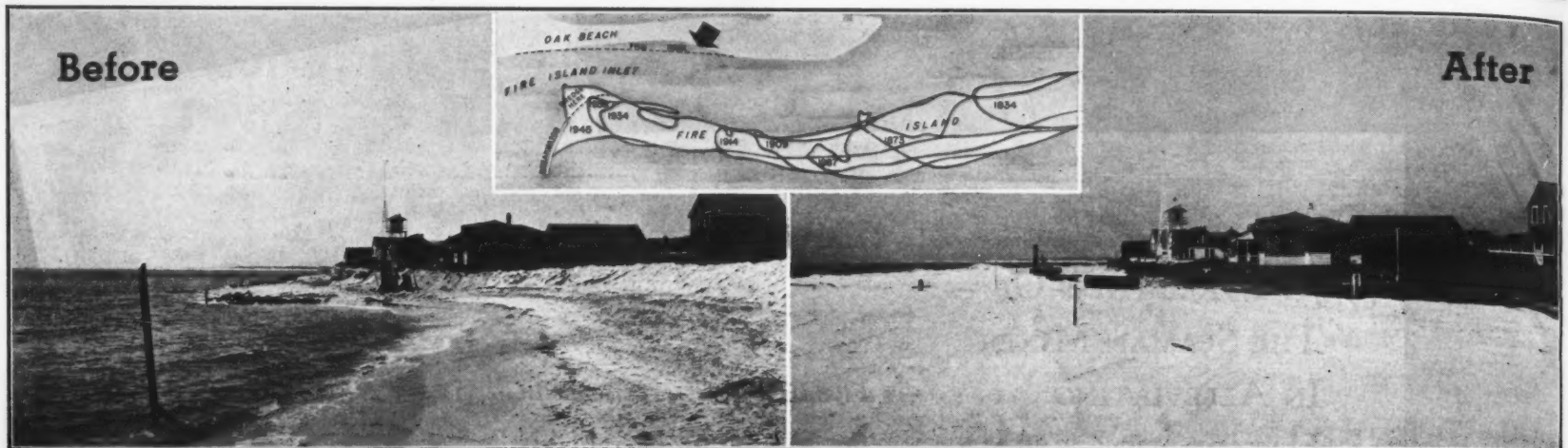


The SEAMAN shown here on runways or highways to facilitate easy removal.

For complete
information
write to:



SEAMAN MOTORS, Inc.
305 North 25th Street
Milwaukee 3, Wisconsin



Sea Channel Dredged and Beach Restored

Baltimore of A. G. & P. Co. Pumps Sand Across Inlet Through 27-Inch Floating And Submerged Pipe Line

★ A BADLY eroded section of Oak Beach, Long Island, has been rebuilt. The work was a project of the New York State Department of Public Works, in conjunction with Suffolk County and the Town of Babylon, with the Long Island State Park Commission cooperating. It was part of the comprehensive post-war state-county-town anti-erosion program on Long Island. The rebuilding was accomplished by pumping sand from the bottom of Fire Island Inlet, one of the major water gateways affording entrance to the Great South Bay from the Atlantic Ocean. The 430,000-cubic-yard hydraulic-dredging job was awarded to the Atlantic Gulf & Pacific Co. of New York City for a contract price of \$149,950. A total of six weeks was required for the contract, as the mobilization and demobilization took nearly a month.

The improvement was financed by funds made available under the State Duryea Act for the construction of erosion-arresting public works along the Atlantic Ocean. It accomplishes a double purpose. First, it diverts from the Oak Beach waterfront the swift tidal currents which were destroying that shore; at the same time it stabilizes the important channel through Fire Island Inlet. Second, it restores the dangerously narrow beach adjacent to the old channel by rebuilding and extending it with the excavated sand. As an incidental result, the new channel makes it possible for commercial and pleasure boats safely to enter the inside bays where the Long Island Intracoastal Waterway lies protected from the ocean by the narrow strip of barrier reef along the southerly shore of Long Island. Prior to this dredging, the inlet was in

about the worst condition in the known history of its existence, and the channel was practically sealed to navigation. Heavy shoaling in the inlet permitted only the most daring pilots to thread their way through the tide-swept waters from bay to ocean.

The elements, naturally, are responsible for this piling up of sand in the narrow channel. Since 1825 the 50-mile-long Fire Island Beach had been migrating west at an annual rate of 200 feet. This remarkable mass movement of sand was arrested only in 1940 when the Army constructed a mile-long jetty at the west end of Fire Island. At the time the huge structure was completed, the effects of the 1938 hurricane had not yet been erased from the channels and beaches in the vicinity of the inlet. On top of this came the hurricane of 1944. This was followed by a succession of severe storms occurring in 1944 and culminating in November and December of 1945. Then a series of erosive seas created new shoals and turns in the tortuous channel.

The big suction dredge Baltimore opened this east-west channel, at the same time making possible the second benefit from the improvement. With the sand pumped from the inlet, a badly eroded section of Oak Beach on the north side of the channel was restored to its normal position. The rebuilt strip of beach is nearly 4,000 feet long, and from 100 to 200 feet wide above mean-water elevation. This necessitated pumping sand on a slope nearly 300 feet long into the water offshore to support the new beach, which was built up to a minimum of 7 feet above mean water at its crest. The erosion had as yet caused major damage to few of the summer cottages which fringe the shore of Oak Beach. However, the waters had swirled dangerously close to the foundation piling of many of these structures. It was only a matter of time until they would inevitably be de-

stroyed and the backbone fill along the barrier reef also threatened.

New Channel

Before this improvement, the existing channel skirted the north side of the inlet which is from 2,000 to 3,000 feet wide. The navigable strip, however, was very narrow and rather deep. The rapid movement of its tidal waters close to shore was a contributing factor to the beach-front erosion. The new channel is on the opposite, or south, side of the inlet. It was dredged there to divert the current from the Oak Beach waterfront. It now curves around the west end of Fire Island near the new jetty for a length of over 4,000 feet, with an average depth of from 15 to 17 feet, and a width from 175 to 250 feet. Both ends meet deep water, and it is expected that strong tidal currents will keep the channel open to its present cross section. While this state erosion-control program has afforded immediate relief to the navigation problem in Fire Island Inlet, the work is expected to be supplemented with further dredging and channel maintenance by the Army.

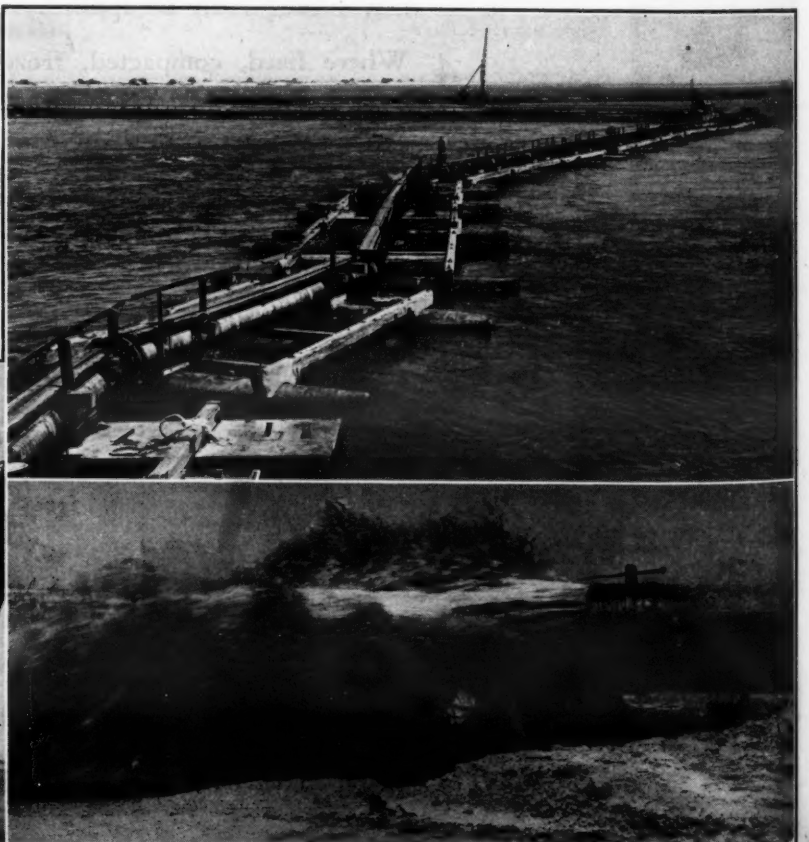
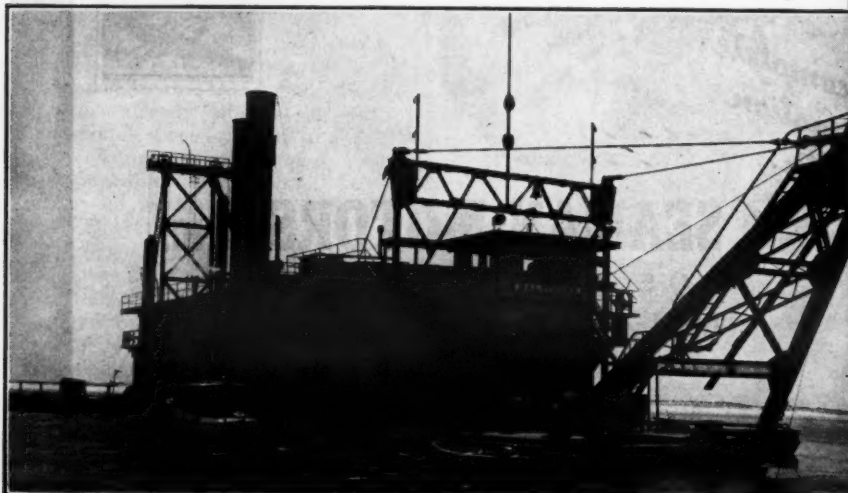
During the dredging, navigation still had to be maintained in the inlet. Consequently a floating pipe line alone could not be used to transport the sand dredged from the channel on the south side of the inlet to the beach front on the north side. This problem was overcome with the use of both a floating and submerged line. The floating line, supported on pontoons, averaged 1,800 feet in length. The submerged pipe

stretched across the bottom of the inlet 1,500 feet until the beach was reached. Because of the shoaling, the floor of the inlet was very uneven, the water varying in depth from 7 to 38 feet. In laying the submerged pipe this irregularity of the bottom was overcome by taking soundings so as to avoid the sharpest variations, and by connecting the 38-foot lengths of 27-inch pipe with ball joints. With this type of joint an angle as great as 17 degrees could be made at each connection when necessary. Thus no length of pipe was ever suspended at its ends without having bearing support at intermediate points.

Twice during the progress of the dredging the submerged line had to be moved as the Baltimore worked down the channel towards the sea, building up the beach on the opposite shore. The floating line entered the water from a derrick barge at a 15-degree angle. It was sunk by dropping the far end into the water, thereby flooding the line up to the barge; it was floated again for moving by pumping the water from the line. The water was forced from the pipe by closing up the floating end with a 1-inch plate into which an 8-inch valve with an air-hose connection had been placed. An Ingersoll-Rand 315-cfm compressor on the derrick barge pumped air into the line through a 1½-inch hose at 150-psi pressure. This forced the water out at the other end, thus bringing the pipe to the surface. When submerged, the pipe-line location was marked with buoys.

(Continued on next page)

Below, a view of the all-steel-hull suction dredge Baltimore, which the Atlantic Gulf & Pacific Co. used on its 430,000-cubic-yard hydraulic dredging job in Fire Island Inlet. At the upper right, the 27-inch floating discharge line connected by flexible ball joints is supported on cylindrical pontoons. Lower right, the discharge flow from the land line is spread by the batter plate at the end of the pipe.



Channel Dredging

(Continued from preceding page)

Dredge Baltimore

The dredge Baltimore was built in Baltimore, Md., in 1935 by the Ellicott Machine Corp. It has an all-steel hull, with 3/4-inch bottom plates, 3/4-inch plates running around the side at the water line, and remaining side plates 1/2 inch thick. The hull measures 174 x 44 x 12 feet. Since its launching, the Baltimore has been in the service of the Atlantic Gulf & Pacific Co. It was towed to the inlet by an ocean-going tug and was taken away in the same manner when its job was completed. On this work the Baltimore had a total complement of 70 men divided into three crews which operated the dredge 24 hours every day. An additional force of 20 made up the land-line crew.

Aft and below decks is the boiler room housing two Foster Wheeler A-type 450-hp boilers. These furnished steam at a pressure of 310 psi through an 8-inch main steam line. Each boiler is fired by five oil burners; they use bunker C fuel oil at the rate of about 300 barrels a day when both boilers are developing a full load. Oil was brought from refineries at Bayonne, N. J., in a 5,500-barrel barge and transferred to the twelve oil tanks on the dredge which have a total capacity of 1,200 barrels. Fresh water for the boilers was obtained from a deep well near Fire Island lighthouse. It was brought by scow to the dredge, which has a water storage capacity of 40,000 gallons distributed over twelve tanks. Alongside the boiler is a de-aerator and water heater which removes the oxygen from the water and warms it for use in the boiler. Two steam-operated pumps then force the water to the boilers at 450-pound pressure.

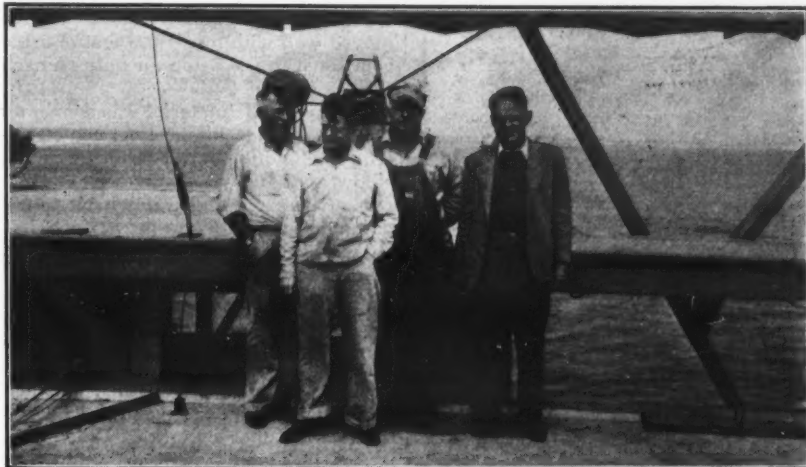
Engine Room

Forward of the boiler room is the engine room containing the prime mover, an Elliott 4,500-hp steam turbine, which is located slightly to the starboard of the center line of the dredge. Revolving at 3,600 rpm, the turbine, through an 11 to 1 reduction gear, drives the main pump at from 275 to 300 rpm. The A. G. & P. Co. pump is forward of the turbine and about 3 feet to port off the center line so as to balance the big prime mover. Weighing 16 tons, the pump has a 32-inch suction with a 27-inch discharge. On this job it used an 84-inch impeller with four vanes. Impellers from 78 up to 90 inches can be used with this pump, according to the length of the discharge line. On the 12-inch shaft directly behind the pump is a Kingsbury thrust bearing which absorbs the thrust of the working pump, relieving the reduction gear to the rear. Forward of the pump is a 32-inch-diameter manhole alongside the intake line. This is opened to remove any obstructions before they enter the pump. The lid is lifted and the debris removed by means of an American Engineering Lo-Hed 8-ton hoist which travels overhead.

Other equipment in the engine room includes a 500-hp steam turbine which drives an Elliott Ridgway direct-current generator at 320 kw and 1,200 rpm. This generator furnishes power to an Elliott 500-hp motor to operate the cutter head at the bow of the dredge. By means of a reduction gear, the 600 rpm of the motor turns the cutter head over at only 32 rpm. Another dc generator of the same type but with 165 kw furnishes power to the 250-hp motor for winding the Ellicott 5-drum hoist at the bow of the dredge. Another auxiliary is a dc exciter generator, 100 kw and 1,200 rpm. Reserve lighting equipment includes a G-E 25-kw dc generator. Water is circulated through the dredge by two pumps, one driven by a Westinghouse 35-hp electric motor and the other by an Elliott 10-hp turbine. A master switchboard on the port side of the engine room controls the various electrical equipment.

Dredging the Channel

Suspended from the bow of the Balti-



C. & E. M. Photo

Aboard the Baltimore: Captain Henry Kennedy; A. G. & P. Co. Superintendent G. H. Warner; Chief Engineer J. M. Rankin; and W. B. Hogan, Engineer in charge for the New York State Department of Public Works.

more on the 60-foot A-frame is a 70-foot ladder weighing 90 tons. At the end of this ladder is a businesslike cut-

ter head, 7 feet in diameter x 5 feet long, with hard-faced teeth on its six
(Continued on next page)

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C. & E. M. Photo

This view, looking out over the new channel to the Atlantic, shows the A-frame of the dredge Baltimore.

Channel Dredging

(Continued from preceding page)

blades to withstand abrasion. If necessary, the cutter head can be lowered to dredge at a depth of 50 feet, but in this inlet the greatest-depth cut was about 22 feet from high water. From the control house at the level of the upper deck the dredge operations are directed. From here the depth at which the cutter head is working can be determined by a glance at the gage on the A-frame. Within the room other gages indicate that in dredging ocean sand the vacuum on the line varies between 15 and 22 inches, while the discharge pressure of the pump averages 100 pounds per square inch.

Levers in this room control the five hoists which are grouped around the winding motor within the deck housing at the bow. The two outside hoists are for the swing lines, while behind these are the hoists for the two spuds at the stern. The ladder hoist is at the center. As the channel is mainly for small craft and not over 250 feet wide, the full swinging potentialities of the Baltimore

were never required. The dredge moved well within its 1,000 feet of cable connected to the 5-ton anchors on each side.

The hydraulic material was drawn up into the 32-inch intake line located directly behind the cutter head. A swivel elbow at the bow permitted free progress of the sand and water back to the pump. From the pump the 27-inch discharge line ascended to deck level on a 45-degree angle. There it made a right-angle turn and continued sternward outside of the housing along the starboard rail. At the stern another turn was made, the pipe passing through the blacksmith shop and then between the spuds to the floating line. The two spuds are steel cylindrical shells, 34 inches in diameter and 65 feet long; they weigh 18 tons each, and are spaced 12 feet on centers.

At deck level amidships surrounding the holds where the pump and heavy dredge machinery are located is a machine shop, well equipped for all kinds of repairs. A Troy 25-hp steam engine,

through a belt system, drives the various pieces of equipment which include a Rahn-Larmon lathe, 24 inches x 12 feet; a Dreses radial drill press with a capacity up to 2-inch holes; a Steptoe 21-inch shaper; and a Greenfield tap and die machine. A 3 x 10-foot workbench with vises and small tools rounds out the shop. The blacksmith shop at the stern has a 3-foot-diameter circular forge with a Champion blower; a 250-pound anvil; and a Westinghouse locomotive air compressor capable of producing air at 100-pound pressure. Welding is done either by a Wilson Yellow Jacket 300-amp electric welder or by an oxyacetylene unit.


Discharge Line


Each 38-foot length of 27-inch discharge line was floated on two cylindrical pontoons, 32 feet long x 52 inches in diameter, placed crosswise near the end of the pipe length. The tanks were held in position by two timber strongbacks through which passed U-bolts encircling the cylinders. For the most

part, the floating line was made up in a triple section of three pipe lengths connected by flexible ball joints making a total length of 117 feet supported on six tanks. On top of the pipe a 20-inch catwalk with a handrail was constructed. On the rail was hung a life ring every third pipe length. As a further safety measure, workers walking the line were required to wear life-preserver jackets. A telephone line is usually strung along the catwalk, or, in the case of a submerged discharge pipe, a submarine cable is laid along the bottom to provide communication between the dredge and the shore crew. Since this job was of brief duration and shore operations were easily seen from the dredge, no cable was laid. Communication was by signaling. The dredge, moreover, was equipped with a radio telephone permitting calls through the regular telephone system.


The greatest concern of the dredging contractor was to keep the floating line in place in an inlet that is well known

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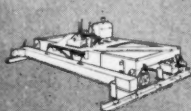
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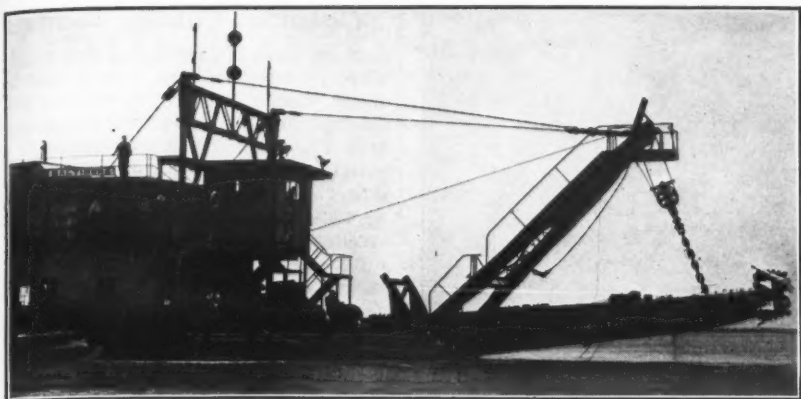
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CONTINENTAL
RUBBER WORKS



shown here are the cutter head, ladder, and A-frame of the Baltimore. This is the dredge used by the Atlantic Gulf & Pacific Co. on its \$150,000 contract to dredge a new sea channel and restore eroded beach at Long Island.

Channel Dredging

(Continued from preceding page)

for swift tidal currents. If the line broke during an ebb tide, the pipe would be swept to sea and lost within a very few minutes. Furthermore, when the contract was awarded the work was scheduled for completion by July 30 to cause the minimum of inconvenience to vacationists along the beach during the peak of the season. The A. G. & P. Co. cooperated fully in this respect. It started the job the latter part of May when the waters around Fire Island were definitely not on their best behavior, and for the two weeks of dredging the channel was mostly choppy. By an adequate system of anchorages the floating line was held securely in position, however, and not a single break occurred. Every 150 feet of floating pipe was tied down with steel cable paying out to an anchor on each side, with an extra anchor at each bend in the line. The anchors varied in weight from 1,000 to 7,000 pounds, with the heavier ones in use at the elbows and at the derrick barge where the pipe line went under water. Hand winches from platforms built on the pontoon strongbacks controlled the Baltimore's anchor cables.

For the land line 16-foot lengths of 27-inch pipe were strung out to a maximum length of 3,200 feet, but most of the dredging was done through much shorter land lines. No valves were used. A Caterpillar D6 tractor with a LaPlant-Choate 8½-foot dozer blade was employed by the land crew to help in the pipe handling, to push up dikes between the sand dunes and thus keep the discharge flow under control, and to assist with a final clean-up of the beach. The discharge end of the pipe consisted of a 6-foot length with the top half cut away and with six 4 x 8-inch bleeder holes in the bottom half. A batter plate, set at a 45-degree angle at

the end of the pipe, broke the force of the discharge and helped to spread the flow. In order to stabilize the fresh, hydraulic-filled beach, over 5 acres of sand above high-water mark were planted with beach grass.

Auxiliary floating equipment employed on this dredging contract included three diesel tugs: the Gilbert and the May, each with 240-hp engines, and the Julie, a 150-hp craft. These tugs were used to tow such other craft as two derrick rigs, each 60 x 30 x 6 feet, of 12 and 8-ton capacity respectively; a 6,000-barrel oil barge measuring 110 x 36 x 12 feet; a 30 x 60 x 6-foot water barge with a 50,000-gallon capacity; and a 120 x 36 x 12-foot pontoon scow.

Personnel

Quarters for the crew are on the upper deck of the dredge. The Master of the Baltimore is Captain Henry Kennedy, and John M. Rankin is Chief Engineer. G. H. Warner was Superintendent for the Atlantic Gulf & Pacific Co. on this dredging and hydraulic-fill contract. William B. Hogan was Engineer in charge of the project for the New York State Department of Public Works. District 10, where the job was located, is headed by J. J. Darcy, Dis-



C. & E. M. Photo
The dredge land crew used this Caterpillar D6 with a LaPlant-Choate dozer blade to level and clean up the rebuilt section of Oak Beach, Long Island.

trict Engineer. Sidney Shapiro, Deputy Chief Engineer of the Long Island State Park Commission, is acting as consultant on the dredging and placing of all hydraulic fill in this erosion-control program. The Oak Beach work was financed 50 per cent by the State, with the remainder of the cost divided evenly between the Town of Babylon and Suffolk County.

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The Gardner cement spreader for use in soil-stabilization work may be mounted on front of a motor grader, as shown at left. Fed by a bulk-cement tank truck (at right) the spreader accurately proportions and spreads the cement on the windrow. It is reported that on one job calling for a 7 per cent application, 109 barrels of cement were spread in 7 minutes, with actual applications ranging from 6.8 to 7.2 per cent.

Spreads, Proportions Cement Load to Soil

A cement spreader for soil-cement mixtures has been announced by A. W. Gardner of the Gardner-Byrne Construction Co., 416 No. Orange St., Redlands, Calif. It is said to proportion cement accurately into the soil or aggregate to be treated.

The Gardner spreader contains a rotating cylinder which, geared directly to the forward motion, passes the cement downward in the required amounts. From the rotating cylinder, the cement is fed through vanes and plowed into the interior of the previously shaped windrow; this prevents loss of cement in the interval before the traveling mixer introduces the water and performs the primary mixing. The spreader is attached to each truckload of cement as it arrives. Where the subgrade is firm, with good traction, the spreader is mounted on a separate chassis which is towed by the truck.

The George Herz contract with the California Division of Highways called for 5.7 miles of 6-inch cement-treated base course on Mission Boulevard, from Mira Loma to within 2½ miles of Riverside. In that case it was found best to mount the spreader on the front of a self-powered blade grader. The blade grader was hooked onto each load of cement by means of a pin joint; then the two vehicles moved along together during the spreading. In this way no towing load was added to the truck.

On the Herz contract each load of 109 barrels of cement was spread in about 7 minutes. The accuracy of proportioning cement to aggregate is reported as follows: designed for 7 per cent, the actual applications ranged within 6.8 per cent

and 7.2 per cent, well inside the California Division of Highways allowance for variation.

For further information on the cement spreader, write to the manufacturer and mention this report in **CONTRACTORS AND ENGINEERS MONTHLY**.

Accidents are unnecessary and costly. Remember—Safety Always Pays!

Calendar-Catalog Ready

A new calendar for 1947 is now available. To secure it, just send a card to the Frederick Post Co., P. O. Box 803, Chicago 90, Ill., and mention this magazine. The calendar, 12 x 20 inches, is a spiral-bound calendar-catalog, with engineering data and full twelve months on the back. It has a color top and 52 weekly pages featuring large date numerals and various Post products.

Evans Joins Caterpillar

Robert D. Evans has joined the Sales-Development Division of Caterpillar Tractor Co., Peoria, Ill., as Civil Engineer Consultant on earth-moving equipment and its applications.

Mr. Evans came to Caterpillar from R. G. LeTourneau, Inc., where he functioned as Chief Field Engineer and traveled throughout the United States and Canada consulting with dealers and contractors on earth-moving equipment applications.

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INDIANA

Timber and Concrete For Low-Cost Bridge

Composite Structure on Treated-Timber Piles Was Built for \$22,974 in Md.; Four Spans Total 83 Feet

THE Maryland State Roads Commission has developed the composite timber-concrete bridge as a long-life low-cost structure for spanning streams of medium depth and width. A good example of such construction was completed this summer over Wagram Creek on U. S. 13 lying between Pocomoke City and the Maryland-Virginia state line—points which have recently been connected by a new 24-foot concrete road. At this spot on the north-south eastern-shore highway, new alignment necessitated abandonment of the old double 15-foot-span concrete bridge with a 22-foot roadway. The new bridge lies about 600 feet upstream from the original structure. It consists of four spans, 17½, 24, 24, and 17½ feet respectively, for a total length of 83 feet, center to center of end bents. It has a 28-foot roadway and two side-walks, or safety curbs—a 3-foot walk on the west and a 2-foot-1-inch walk on the east side. Should dual highway construction ultimately be provided for the bridge, the smaller sidewalk would be on the interior and little used.

A contract for the bridge construction was awarded to the Old Line Construction Co. of Chestertown, Md., on its low bid of \$22,974. Work was started in August, 1945, and completed June 20, 1946. Progress was slow because of the timber shortage, and activity ceased during the winter months. But construction picked up again this spring when materials became available. Bad weather caused a little delay in laying macadam pavement on the approach fills. At some future date when any possible settlement has ceased, these will probably be repaved with concrete.

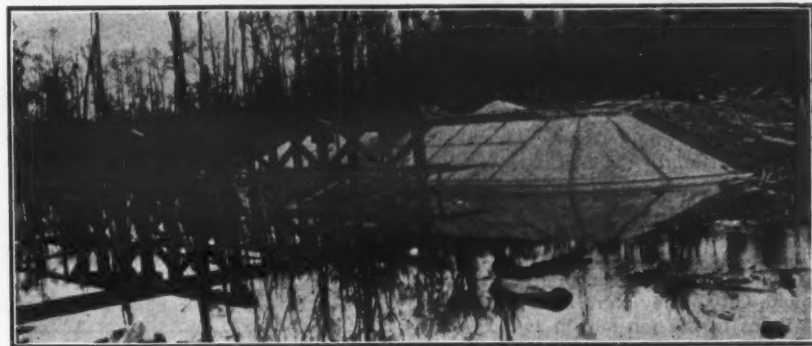
Substructure

The bridge is supported on five treated-timber pile bents, seven piles to a bent, driven on 5-foot 3-inch centers. The piles are 48 feet long with 8-inch tips and 15-inch butts; they were treated with 12 pounds of creosote oil to the cubic foot. The treated timber, practically all southern yellow pine, was purchased from the J. I. Wells Creosoting Plant at Salisbury, Md. The firm delivered the treated material to the job by truck, a distance of approximately 33 miles. Driving was done with a 3,000-pound drop hammer suspended in swinging leads from a Koehring crane, aided by a jet using water pumped from the creek by a couple of Jaeger 3-inch pumps. The driving and jetting of the piles through at least 10 feet of solid material insured a safe bearing value of 20 tons.

After being driven, the piles were cut off with crosscut saws at elevation 12, and were then cross-braced with 8 x 10's. On top of the center pile, which had a lower cut-off elevation, a 12 x 12-inch x 3-foot-long corbel block was next

erected. The bents were capped with two 12 x 12-inch x 17-foot-7-inch timbers, which were butted together on top of the corbel block.

From the two end bents the fill embankment sloped 2 to 1 to the edge of the water. To prevent erosion the fill was paved with a 6-inch concrete slab divided into blocks averaging 4½ x 6 feet. At the bottom of the slopes, which are about 24 feet long, a concrete toe wall, 1 foot wide x 3 feet deep, was built in front of the end bent and extending around to the sides. The contractor had to place a small cofferdam in order to unwater and construct this toe wall and the fill at each end of the bridge. Wooden forms were used for the fill-protection slabs. A stiff concrete—never with



C. & E. M. Photo

Here you can see the center and south bents of the 83-foot bridge, and the 6-inch concrete slab to protect the embankment slope from erosion.

a slump of more than 2 inches—which had to be pushed down the chutes was employed in the mix.

Concrete was mixed in a Koehring Dandie 2-bag mixer after the batches had been weighed on a Winslow Jr. scale. Six wheelbarrows brought the sand and gravel to the mixer. The dry

weights of a 2-bag batch were as follows:

Cement	188 lbs.
Sand	524 lbs.
Gravel	800 lbs.

Water pumped from the creek by a Jaeger 2-inch pump was added to the mix at the rate of 6 gallons to the bag.

(Concluded on next page)

EUCLIDS Build "EARTH BRIDGE" across valley



★ BOTTOM-DUMP EUCLID ADVANTAGES



**FASTER
TURNING**

Sturdy, universal trailer hitch with ample clearance for hopper and doors.



**QUICKER
DUMPING**

Steep, smooth sides of the trailer and unobstructed door openings full length and width—control for opening and closing the doors is conveniently located on the steering column.

★

THIS railroad re-location project in Tennessee* required the construction of a fill or "earth-bridge" averaging 175 feet wide at the base and tapered to 24 feet at the top. One-half mile long, the fill is 50 feet high and consists of 496,000 cu. yds. of earth and gravel.

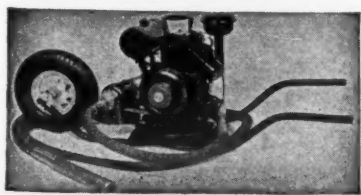
The Wolfe-Michael Co. used five Bottom-Dump Euclids of 13 yd. capacity which were loaded by a 1¾ cu. yd. shovel. Average speed of the Euclids for the 7,040 ft. haul was 12.5 m.p.h. including turns on fill and at the loading shovel.

Exceptional maneuverability and short turning radius of the Bottom-Dump Euclids were important on this job because of the close working quarters and narrow fill. Fast travel speed on the difficult haul road and the ability of Euclids to dump their loads quickly saved time and reduced hauling costs.

All Euclid models, Rear-Dump and Bottom-Dump, are designed and constructed for a single purpose—to move earth and other materials over off-the-highway hauls at lowest cost. Your Euclid distributor will be glad to provide information and specifications on the models best suited to your requirements.

*Part of the improvement program of the Nashville, Chattanooga and St. Louis R. R. near Dickson, Tennessee, west of Nashville.

The EUCLID ROAD MACHINERY Co., CLEVELAND 17, OHIO



Complete line of gasoline, pneumatic and electric driven concrete vibrators and grinders. Write for information and prices.

ROETH VIBRATOR COMPANY

1737 Farragut Ave.

Chicago, Ill.



Low-Cost Bridge

(Continued from preceding page)

Bag cement was purchased from the Alpha Portland Cement Co. at Martins Creek, Pa., and shipped to the site via the Pennsylvania railroad. Sand, with a gradation of $\frac{3}{8}$ inch down to No 100, and gravel, from $1\frac{1}{2}$ inches down to No. 4, came from local pits near Pocomoke City. They were hauled the 3 to 4 miles to the job site in two $1\frac{1}{2}$ -ton trucks.

Superstructure

The bridge superstructure consists of a laminated-timber deck covered with concrete. With the use of laminated members the effective depth of the beam is increased; yet a considerable saving is made in the amount of timber used. The timbers, with a strength of 1,200 pounds, had been treated with 12 pounds of creosote oil to the cubic foot, and under the roadway are 2 x 10's only. The laminations were produced by putting a 2 x 2 x 14-inch-long block under each alternate stringer at the pile caps. Underneath the walks alternate 2 x 10's and 2 x 12's were used.

To prevent a horizontal shearing action between the wood and concrete of the composite deck, shear developers were driven into the recessed laminations on spacing ranging from 6 to 15 inches according to the design. The shear developers are thin metal plates, $\frac{1}{10}$ inch thick, in the shape of a trapezium, with a lower base of $\frac{1}{2}$ inch, the upper base $3\frac{3}{4}$ inches, and the distance between $3\frac{1}{2}$ inches. These were driven with the small base down to within $\frac{1}{2}$ inch above the level of the top lamination, on the theory of resisting horizontal shear and preventing the concrete from sliding on the wood.

To check any vertical cleavage or displacement of the concrete in that direction, 60-penny nails were driven at an angle of 60 degrees to the horizontal into the upper lamination on 2-foot centers. Called uplift spikes, these nails were driven so that they projected $1\frac{1}{4}$ inches above the upper lamination with the design intent of holding the concrete in position.

Prior to pouring the concrete deck on top of the laminated stringers, a steel-bar mat was laid for additional strengthening. The deck slab was then laid, $6\frac{3}{4}$ inches thick at the center and $4\frac{1}{2}$ inches at the curb. To prevent any deflection in the slabs during the concreting operations, the first pours were over the long spans. But they came only to within 6 feet of the bent at each end, the length of pour being 12 feet. The end spans were poured next, also to within 6 feet of the bent, or a distance of 11 feet 6 inches. Then the three remaining 12-foot sections over the bents were poured last.

The bridge was finished off with a reinforced-concrete railing 2 feet 9 inches high. It has posts 3 feet 1 inch high, 5 feet apart, and connected by two precast concrete rails. The 5 $\frac{1}{2}$ -inch-square rails are set with a pointed corner upward and extend 3 inches into the posts. Because the sand in the mix contained a large percentage of pea gravel and was somewhat coarse, the proportions of aggregate for the post pours were changed slightly from the design mix used in the slab. For the posts the sand and gravel proportions were 48 and 52 per cent respectively, compared with 42 and 58 per cent in the slab. To prevent possible honeycomb in the base of the posts at the sidewalk level, 2 inches of sand-cement mortar was placed in the bottom of the post forms; the regular mix went on top of the grout.

To someone driving over a composite bridge like this, the appearance is that of an all-concrete structure. With its H-20 loading the new bridge is suffi-



C. & E. M. Photo

This view of the new 83-foot timber-concrete bridge to carry U. S. 13 over Wagram Creek in Maryland shows a section of laminated treated-timber deck in place across the spans. The Old Line Construction Co. was the contractor.

ciently strong for its location on an important artery of traffic.

Quantities and Personnel

An average force of twelve men was employed in the construction of this bridge. The major items included the following:

Excavation	100 cu. yds.
Treated-timber piles	1,350 lin. ft.
Concrete	90 cu. yds.
Reinforcing steel	12,800 lbs.
Fill-protection slab	500 sq. yds.
Shear developers	2,500 lbs.

Parks Goodnight was Superintendent for the Old Line Construction Co. William D. LeFevre was Resident Engineer for the Maryland State Roads Commis-

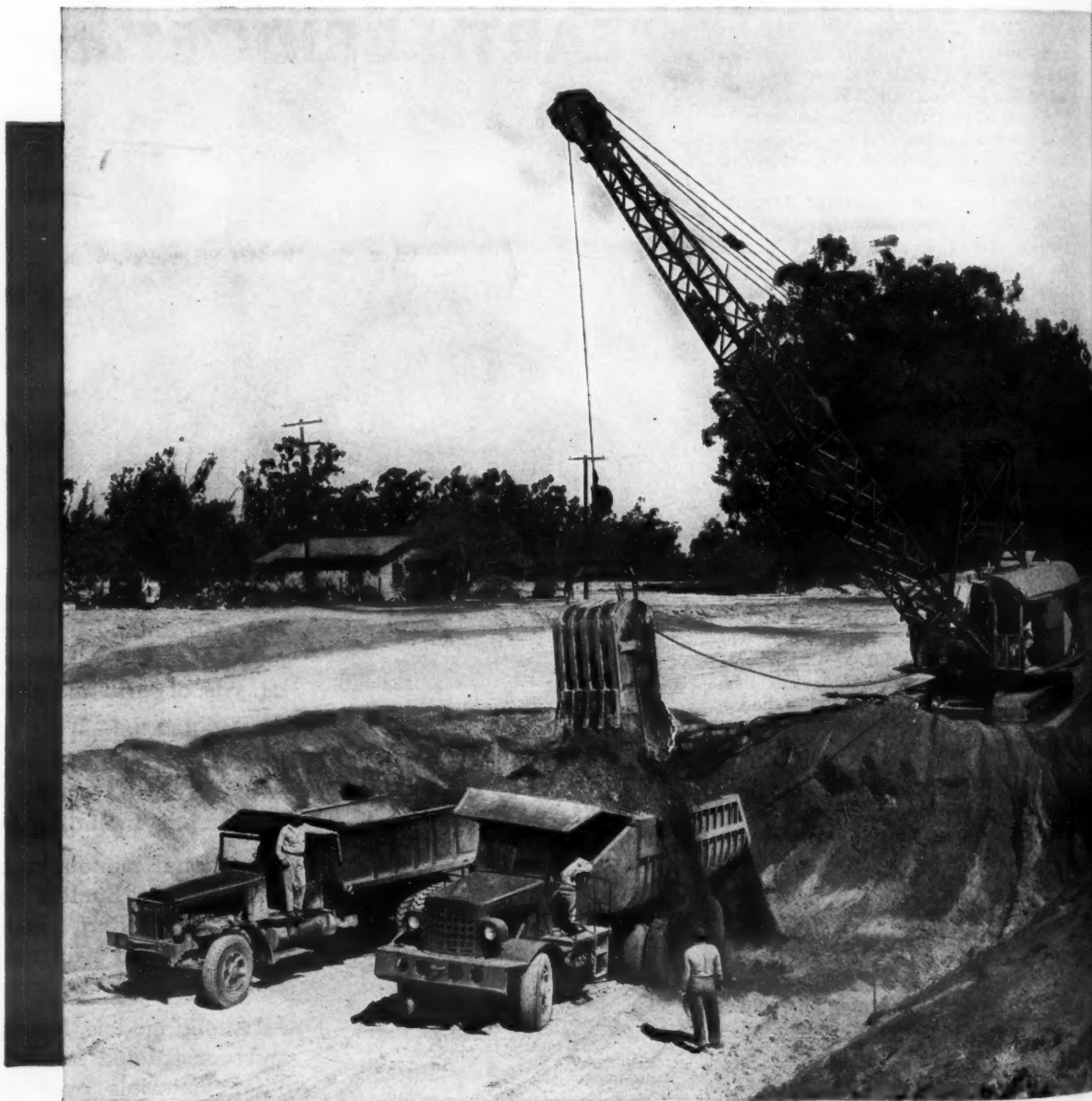
sion, which is headed by Wilson T. Ballard, Chief Engineer. T. M. Linthicum is Acting Construction Engineer.

Maintenance Tools

Its revised and enlarged machine-maintenance manual is now available for distribution, the Owatonna Tool Co. has informed us. It shows the easy, fast, and safe ways to handle many industrial and diesel maintenance operations involving the removal and replacement of gears, bearings, pinions, fly wheels, shafts, flanges, and other parts usually difficult to remove without damage. Also illustrated are the new OTC industrial maintenance and diesel service sets, providing a complete OTC pulling system to meet the needs of construction contractors, highway departments, etc.

To obtain this manual, write to Owatonna Tool Co., 348 Cedar St., Owatonna, Minn. Mention CONTRACTORS AND ENGINEERS MONTHLY and request OTC Bulletin PE-46.

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Tune in . . .
TEXACO STAR THEATRE
presents the NEW
EDDIE BRACKEN SHOW
every Sunday night.
Metropolitan Opera
broadcast every
Saturday afternoon.



TEXACO

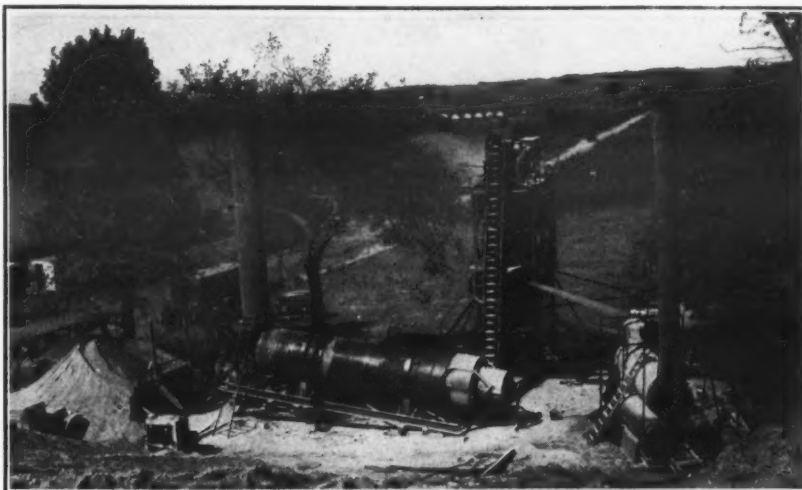
Texas Anti-Diversion Amendment Is Carried

On November 5, Texas residents voted on a proposed constitutional amendment to prohibit diversion of motor-vehicle funds from highway purposes. The amendment carried by a vote of about four to one; exact figures on the balloting were not yet available.

The amendment provides that all net revenues derived from taxes on motor fuels and lubricants and motor-vehicle registration shall be used only for highway purposes. One-fourth of the proceeds, however, will be used for school purposes, in accordance with an existing provision of the Texas State Constitution.

New Tractor Data

Improvements incorporated into its HD-10 diesel tractor are highlighted by Allis-Chalmers in a new 24-page brochure. Data are given in the catalog on standard and auxiliary attachments,



C. & E. M. Photo

This view shows the Madsen asphalt plant set-up used by McCree & Co. to produce bituminous resurfacing material for 15 miles of mat overlay in southern Minnesota.

transmission construction, longer track design, engine dimensions and fuel capacities, etc. Write Allis-Chalmers Mfg.

Co., Tractor Division, Milwaukee 1, Wis., and ask for Form MS-402A, mentioning this notice.

Bituminous Mat

(Continued from page 1)

vate vehicles, was only 18 feet wide—a dangerous width for today's heavy trucks and busses. The concrete surfacing over the 15 miles between Northfield and Faribault was heaved and cracked; sharp curves over the entire distance further complicated and congested traffic.

The Minnesota State Highway Department recognized the obsolescence of the old highway and the necessity of bringing it to safer, more modern standards. Yet it hesitated to spend any large sum of money on the road, due to proposed new construction along new locations. It decided it could best serve the interests of the motoring public by widening the existing road to 20 feet, and overlaying the old pavement with a bituminous mat varying in thickness from 1¼ to 1½ inches. Bids on the 15-mile project, involving 13,680 tons of plant-mixed bituminous surfacing, were opened at a regular Friday State Highway Department letting by M. J. Hoffmann, State Highway Commissioner. The low bid of \$56,947.50 submitted by McCree & Co., St. Paul, won the contract. On July 12, the contractor's crew started setting up the asphalt plant.

Plant Set-Up

McCree & Co. was fortunate in finding a good gravel pit with plenty of aggregate about ¼ mile off the highway and near the center of the project; at this location the contractor built a railroad spur. He decided to run production of aggregate and bituminous mix as one operation, and the asphalt plant was set up to permit conveyor feeding to the drier from the crusher.

At the edge of the large pit, a Pioneer 8 x 36 duplex crushing plant powered by a Caterpillar D13000 diesel engine was set up. In the pit a Speeder ¾-yard shovel fed to an 8-inch grizzly and the material was conveyed to the crusher. The crusher fed ¾-inch aggregate to a 24-inch 40-foot conveyor running directly to the drier.

From the Madsen drier, powered by an International 50-hp diesel, aggregate was carried up an open bucket elevator about 32 feet high to the 4,000-pound Madsen mixer; the latter was powered by a Murphy ME6 160-hp diesel unit. Aggregate was weighed by Fairbanks-Morse scales before reaching the plant. The mix was 95.5 per cent ¾-inch aggregate and 4.5 per cent AC-1 cut-back asphalt, of 85 to 100 penetration.

A 90-hp boiler was used with the plant, and fuel oil, heated by steam, was fed by a steam pump. Socony Vacuum AC-1 asphalt, shipped by rail from Casper, Wyo., and Augusta, Kans., was pumped from tank cars through a 5,600-gallon heater tank. Altogether 816 tons of AC-1 were used on the job. The RC-2 for the tack coat, also purchased from Socony Vacuum, was stored in a 5,000-gallon tank at the site. A total of 21,500 gallons was used. Western Oil & Fuel Co. Husky Fuel Oil No. 5 was stored in a 4,000-gallon tank.

Production Schedule

The entire project was set up on a production schedule of 750 tons per 10-hour day. From the Speeder shovel in the pit to the trucks hauling the bituminous mix, each unit functioned as another gear in a smoothly moving operation. At the plant, a checker timed the arrival and departure of the nine Ford and International trucks used to haul the mix. Between 2½ and 3 minutes were required to load each truck which carried three 2-ton batches. With a 7½-mile maximum haul to the spreader, the trucks averaged about

(Concluded on next page)

COSTS ASSURED



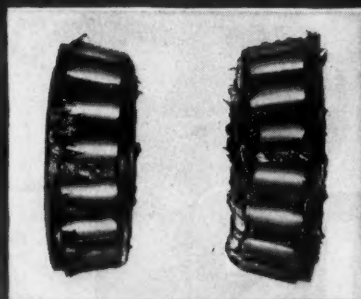
"Hammer Test" proves Marfak protects parts longer.



"Stretch Test" proves Marfak seals out dirt and moisture.

USE A LUBRICANT THAT PROTECTS CHASSIS LONGER — TEXACO MARFAK. The pictures tell why Marfak protection lasts longer. Marfak won't splatter under the heaviest blows of a hammer — won't squeeze or jar out of bearings under hammering road shocks, either. It cushions the parts, adds miles to their life.

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Marfak Heavy Duty makes wheel bearings last longer.

USE A LUBRICANT THAT ADDS LIFE TO WHEEL BEARINGS — TEXACO MARFAK HEAVY DUTY. Despite heavy loads and high speeds, Marfak Heavy Duty stays in the bearings. It provides fluid lubrication inside, but retains its original consistency at the edges — thus sealing out dirt and moisture, sealing itself in, assuring safer braking. No seasonal change is required.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Bituminous Mat

(Continued from preceding page)

two trips per hour.

Laying the Mat

The concrete slab and the dirt shoulders were prepared for the bituminous mat by State Highway Department maintenance crews. The old slab was scraped and cleaned; scrapers went down an inch over the 1-foot shoulder width on either side of the slab to provide for the 2-foot widening.

A tack coat of RC-2 was applied over the old slab by a Standard Steel Works 1,000-gallon distributor on a Dodge truck. At the start of work, this tack coat was applied at the rate of 1/10 gallon per square yard. With traffic running over the road continuously, however, it quickly became apparent that the tack coat was too heavy and was creating a traffic hazard. State Highway Department District Maintenance Engineer George Christlaw cut the application in half. Traffic was of considerable assistance in spreading and ironing out the tack coat.

The bituminous mat was laid to a thickness of 1 1/4 inches for 4 miles north from Faribault, and 1 1/2 inches for the remaining 11 miles. One 10-foot lane was laid down one lane of the highway during the morning, and back the other lane during the afternoon. Despite curves, about a mile of 20-foot mat was laid each working day.

The three 2-ton batches hauled by each truck were dumped to an Adnurn Black Top Paver, and the mix was rolled with an Austin-Western 10-ton roller and an 8-ton converted steam roller. The biggest slowdown on the job developed as the contractor laid the mat over a narrow old bridge in the village of Dundas. Bad curves and the narrow bridge reduced output on this day to 25 tons.

Profitable Extras

As so often happens when an asphalt plant is set up in a community and residents learn of both the advantages and economy of bituminous surfacing, McCree & Co. found an opportunity for several profitable extras. The cities of Northfield and Faribault decided to avail themselves of McCree's plant, so the contractor spent a day or two resurfacing streets in those cities. In the country as well as in the cities, there were also several residents who recognized the desirability of low-cost bituminous-surfaced driveways.

Quantities and Specifications

State Highway Department specifications for this contract called for furnishing all materials complete in place within a period of 30 working days. The contractor employed a crew of 35 men, worked 10 hours a day, 6 days a week. The work was started on July 30 and was completed 23 working days later.

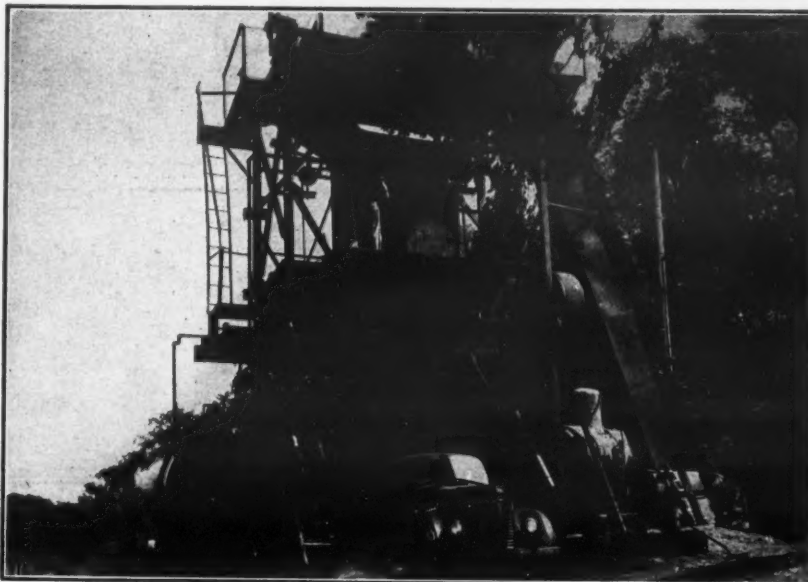
Principal quantities included 21,500 gallons of RC-2 for the tack coat and 816 tons of AC-1 for the mix. The bituminous mix for the wearing course

ran 13,600 tons; and the bituminous surfacing on the job totaled 190,000 square yards.

Personnel

The contract was performed by McCree & Co., St. Paul. The President of the firm, A. A. McCree, is prominent in the construction industry and is a national Director of the Associated General Contractors of America, representing the states of Minnesota, Iowa, North and South Dakota. Construction Superintendent for the contractor was R. B. Brielmaier of Mankato. The Asphalt Foreman was V. F. Brielmaier, Mankato, and the Road Foreman was Fred Anderson, also of Mankato. The Office Engineer was R. W. Chilstrom of Duluth.

In charge of operations for the Minnesota State Highway Department was District Maintenance Engineer George Christlaw of Owatonna. J. C. Robbers is Assistant Maintenance Engineer in charge of all special maintenance projects for the Maintenance Division.



C. & E. M. Photo
An International truck gets its load of three 2-ton batches of bituminous resurfacing material at the Madsen plant for a 7 1/2-mile haul to the road.

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Three Goals Stressed In Roadside Seeding

Speaker Suggests Low-Cost Methods Of Establishment and Upkeep, With Protection From Soil Displacement

† THERE are three main goals in roadside seeding operations, according to Dr. Fred V. Grau, who delivered a lecture on this subject during the Fifth Annual Short Course on Roadside Development at Ohio University, Columbus, Ohio. Dr. Grau is the Director of the Green Section of the United States Golf Association at Beltsville, Md. These goals are: (1) effective low-cost establishment of turf or other ground-covering areas, (2) minimum maintenance on these areas, with (3) maximum protection from soil displacement.

He stated that, in addition to the seed, lime, and fertilizer used to insure success, effective establishment requires a protective covering to prevent soil displacement until establishment is assured. The cheapest and most effective covering, he said, is organic mulch. Lessons learned in slope seedings over a period of years indicate that any seeding contract which omits organic mulch needs to be carefully scrutinized before being approved.

Concerning low-cost establishment, Dr. Grau stated that slopes should be left naturally rough, as the prime contractor leaves them upon completion of his grading operations. There should be no further fine "sand-papering" of

slopes prior to seeding, except to level contours sufficiently to permit maintenance machinery to operate efficiently. Wherever possible, the materials should be applied by machinery in order to cut down on expensive man-hours of hand labor. The last point he brought out in this connection was to use the minimum quantities of seed adequate to the purpose.

Obtaining the maximum protection from soil displacement means a covering of organic mulch. It is also important, Dr. Grau pointed out, to use areas of solid sodding immediately surrounding catch basins and drainage outlets. There should be, for best results, a minimum delay between acceptance of grade after construction and completion of seeding operations.

The speaker then went on to say that to achieve the lowest expense in maintenance, one should be very careful in the species of seed used. The most desirable include those which require little or no mowing and present no fire hazard. One should also take advantage of plant competition in order to obtain maximum weed control through natural means. Dr. Grau suggested alfalfa, fescue, brome, orchard grass, Lotus, and Coronilla.

The Director touched on seeding machines, mentioning the Gunit-type machine used on the Pennsylvania Turnpike, and the Mud-Jack which, with some modifications, has been used in Connecticut. For relatively inaccessible slopes, the ensilage cutter, or silo filler, with adjustable delivery pipe might be used in laying down seed, fertilizer, and mulch.

To Dr. Grau's knowledge, there have been no recent developments in roadside-maintenance machinery. He feels that none are needed for slopes, and indicated the use of high-speed power mowers for road shoulders. He concluded his discussion with the observation that continued research is necessary on new ideas, methods, and machinery to help our highway departments solve their roadside-development problems.

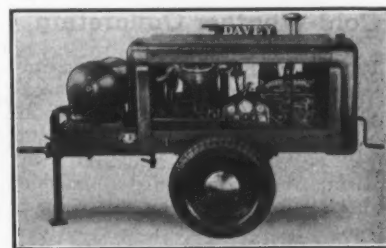
Gillespie Succeeds Father

The Flexible Steel Lacing Co. of Chicago has announced the appointment of James Gillespie as its sales representative for Texas, Oklahoma, Arkansas, and Louisiana. This territory was formerly handled by his father, the late J. W. Gillespie.

Portable Compressor

A new portable compressor is available in a standard skid model and a 2-wheel pneumatic-tired trailer mounting; it also comes with flanged wheels for railroad work. It is manufactured by the Davey Compressor Co., No. Water St., Kent, Ohio. Known as Model 60V, it is offered, too, as the Auto-Air compressor for truck mounting, complete with a Davey heavy-duty power take-off.

The compressor produces 60 cfm at 100-pound pressure. It has one low-pressure cylinder with a 5¼-inch bore and a 4½-inch stroke. The high-pressure cylinder has a 3¾-inch bore. The operating speed is 1,225 rpm. The 2-wheel model has an overall length of



This Davey heavy-duty compressor is the Model 60V. It also comes in skid, flanged-wheel, or truck mountings.

88 inches, width of 62 inches, height of 51½ inches, and a weight of 2,100 pounds. The tire track line is 52½ inches. Power is provided by a Hercules IXB engine. Write to the firm at the address mentioned for further details.

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FULL REVERSED

SHOULDER GRADING

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A "TOP GRADER" in the books of any user

Contractors and Public Officials, who keep a close record on equipment operation costs and performance, will find the new GALION 102 Motor Grader "top grade" on both counts. The tremendous power and pressure at the call and under the complete control of the operator's fingertips, saves countless hours of time in shaping roads, airports, and other grading jobs right up to specifications.

FULLY REVERSIBLE BLADE

The GALION 102 is tops in the ease, precision, and completeness of its maneuverability. The hydraulically operated circle reverse, side shift, and blade lift, plus the high-arched box-type frame permit quick and exact adjustment of blade to each specific job—whether for ordinary blading or high bank cutting.

If you are not completely familiar with what the GALION 102 can do for you—write for Catalog No. 290.

The GALION IRON WORKS & MFG. COMPANY

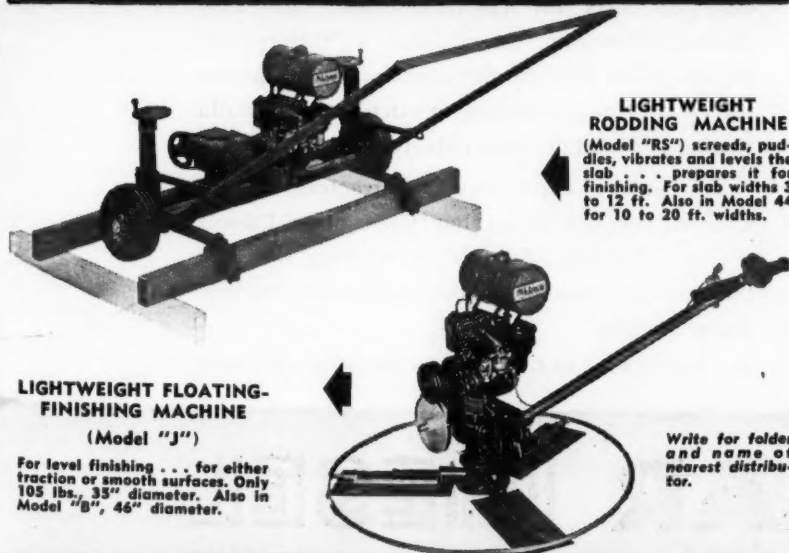
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For level finishing . . . for either traction or smooth surfaces. Only 105 lbs., 35" diameter. Also in Model "B", 46" diameter.

Write for folder and name of nearest distributor.

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WHITEMAN MFG. CO.
3249 Casitas Ave., Los Angeles 26, California

Cold-Weather Concreting

The problem of whether to pour concrete in the winter, or wait for "building weather", is one which confronts all concrete men. The Lone Star Cement Corp., maker of Lone Star and Incor portland cement, has issued a pamphlet setting forth its views on this subject. It contends that proper selection and proportioning of materials, together with adequate heat protection, furnish the solution to cold-weather concreting.

The 16-page pamphlet includes several tables showing the results obtained from various mixes poured at different

temperatures, and the strengths obtained therefrom. It also contains many suggestions and pointers for cold-weather pouring, based on what the company deems advisable job practice.

The pamphlet may be obtained directly from the company at 342 Madison Ave., New York 17, N. Y., by reference to this item.

All-Steel Hand Winch

Details about the Handiwinch, an all-steel unit said to be capable of handling a 10,000-pound load, are given in a mailing piece, Form HW-4, which the

American Hoist & Derrick Co., Robert and Water Sts., St. Paul 1, Minn., will be glad to send on request. Just mention this notice.

Leaves Worthington

Joseph W. Sargent has resigned as Eastern Manager of the Construction Equipment Division of Worthington Pump & Machinery Corp. to become Sales Manager of construction equipment for the American Air Compressor Corp. Located in North Bergen, N. J., American represents Worthington-Ransome in northern New Jersey.

Form for Recording Bids

A simplified form on which to record bids at contract lettings is now available to readers of CONTRACTORS AND ENGINEERS MONTHLY. Made of light cardboard, it folds into three sections and fits easily in the pocket. It is ruled in such a manner as to permit easy breakdown of the job into its component parts and recording of the various bids on each.

Readers who are interested in these forms may obtain them by writing to the B. F. Goodrich Co., Advertising Dept., Akron, Ohio.

KNOW YOUR LAST COST FIRST



▲ Two "Caterpillar" Diesel Tractors—a D7 and a D8—are shown pulling scrapers on the Niobrara River project. Leveling the fill is a "Caterpillar" Diesel No. 12 Motor Grader.

▲ This "Caterpillar" Diesel 34-15 Electric Set generates all power for the construction of wooden forms used by Roush Construction Co.

"**C**ATERPILLAR" Diesels have had to be good to get where they are—at the top in earthmoving.

It isn't their purchase price, for "Caterpillar" equipment doesn't come cheap. It's their rugged stamina, high earning power and low *last* cost that makes so many successful owners demand nothing but "Caterpillar" Diesels.

Roush Construction Co., of Cheyenne, Wyoming, is using "Caterpillar" Diesel power exclusively on its part of the Niobrara River soil-conservation project. With a fleet of "Caterpillar" Diesel Tractors and a "Caterpillar" Diesel No. 12

Motor Grader the company is building a "railroad dike" to carry an irrigation canal, near Hay Springs, Nebraska. In addition, a "Caterpillar" Diesel 34-15 Electric Set supplies all the power for sawing and fabricating wooden forms to build the concrete flumes and culverts.

Like other experienced contractors, Roush Construction Co. knows that "Caterpillar" Diesels are built for long, dependable working life, and that their low final cost is backed by sure, efficient dealer service.

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ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

—for lowest costs on earth

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Method Used in Dams and Similar Jobs Is Adapted Successfully to Building; 15,000 Yards Placed

By S. PERLITER, Perliter & Soring, Engineers, Los Angeles, Calif.

♦ **PUMPCRETING** a reinforced-concrete building is a somewhat unusual application of this type of equipment in the Los Angeles region. However, a Pumpcrete machine is being used in the construction of a new department store owned by the May Co. of that city. Although the machine has been accepted in practically all other kinds of construction its use has not been adopted generally in building structures of this type. With its employment, a central plant and a pipe line can place concrete almost anywhere, usually with substantial savings in expense and labor, and with the allowance of greater freedom for other construction activities.

Pumpcreters were introduced on the Pacific coast in 1932. At that time it was proved to the builders of Boulder Dam that the pumping method would be the solution to the placement of 250,000 cubic yards of concrete which was required on that project from 1932 to 1934. In 1934, 75,000 cubic yards of concrete was pumped off shore into the piers of the San Francisco-Oakland Bay bridge. From 1935 to 1937 more than 600,000 cubic yards of concrete was placed by this method in tunnels of the Colorado River aqueduct of the Metropolitan Water District of Southern California. It was in this latter project that many of the original operating difficulties were overcome and the present-day operating technique was developed.

The first large building in Los Angeles to be constructed with use of Pumpcrete was the 17-story Federal Post Office, where 50,000 cubic yards of concrete was pumped into place.

Present Project

When completed, the May Co. store will be a 3-story, mezzanine, and full-basement structure. It will allow approximately 261,500 square feet of floor space, and will contain 15,000 cubic yards of concrete. It will have reinforced-concrete floor slabs and roof, an architectural concrete exterior trimmed with black Granux, and marquees on three sides. It will be supported by 1,500 Monotube piles capped with reinforced-concrete mats 6 to 8 feet deep. Columns are spaced in a rectangular pattern 24 x 20 feet and vary in diameter from 30 inches in the basement to 15 inches on the third floor. Floor construction of the building is unique in that 6-inch slabs are supported by beams 12 inches deep and 6 to 8 feet wide. Reinforced-concrete exterior walls vary in thickness from 14 inches in the basement to 10 inches on the third floor.

Ready-mixed concrete for the building is supplied from a permanently located plant some distance from the construction site. Loaded truck-mixers back up to a short ramp. They dump into a re-mixer set directly over a Pumpcrete single-cylinder centrally located in the construction area. From the Pumpcrete, concrete is pumped through an 8-inch pipe line to all parts of the structure. The pipe line is made up of sections 10 feet long, held together by special quick-opening toggle couplings. Shorter lengths of pipe are provided, as well as a variety of elbows to facilitate pumping of concrete to any location and in any direction.

The concrete-placing crew is made up of 3 vibrator men, a hose tender, 4

shovel men, 2 clean-up men, and 3 pipe tenders—13 men in all. When the building was 75 per cent complete, the largest pour had been 306 cubic yards in a 10-hour shift. The normal pour for a Pumpcrete of the size used on this job is 200 to 250 cubic yards in an 8-hour shift. The longest length of pipe employed on this job was approximately 475 feet of horizontal run and 70 feet of vertical run. In this arrangement a horse 6 feet high was placed under each 10-foot section of pipe, and a distributing spout was used to direct the concrete to any exact point.

One of the advantages found in placing concrete with Pumpcrete on this job has proved to be that the area around the placing operations remained

(Continued on next page)



Truck-mixers deliver ready-mixed concrete direct to the hopper of the Pumpcrete which placed 15,000 cubic yards of concrete in a building in Los Angeles.

Super Service

ON ALL TYPES OF JOBS!

1/2 and 3/4 Yard
EXCAVATORS

5 and 10 TON
CRANES

**CONTACT
FACTORY
DIRECT
FOR PRICE
AND DELIVERY**

Every UNIT is FULLY CONVERTIBLE

Regardless of whether your job calls for a shovel, clamshell, magnet, dragline, trencher, grapple or backfiller, a UNIT machine easily "fills the bill"! For UNIT is convertible to ANY attachment and gives an excellent account of itself on ALL types of service. The change from one attachment to the other can easily and quickly be made on the job, by any ordinary mechanic. UNIT exclusive features include: Automatic traction brakes... Disc type clutches... One-piece cast gear case and above all, UNIT's safety promoting FULL VISION CAB.

UNIT CRANE & SHOVEL CORP. 6309 WEST BURNHAM STREET
MILWAUKEE 14, WIS., U.S.A.

Concrete in Building Placed by Pumping

(Continued from preceding page)

clear and free of runways, buggies, and other congestion. This eliminated the necessity of additional labor and time for straightening reinforcing steel and other general clean-up.

The May Co.'s Crenshaw store was designed by Albert C. Martin & Associates, Architects and Engineers of Los Angeles; Samuel A. Marx of Chicago was Associate Architect. The Joshua H. Marks Co. is the general contractor, and the Pumpcrete equipment on the job is under the supervision of Albert Nicholson and Raymond Hamby. C. C. De Armond is Construction Superintendent for the contractor.

The Mix Used

The mix used on the May Co. job is designed to have a slump of 3 inches. This is about the most dependable moisture content for concrete that is to be pumped. However, satisfactory results have been achieved in pumping concrete with a consistency as dry as to give a 1-inch slump and as wet as to produce an 8-inch slump.

The following tables show the concrete mix on the May Co. building.

MIX A

For slabs and mass concrete and where placing concrete through reinforcing steel is not a problem, 28-day strength, 3,000 lbs. Maximum aggregate 1½ inches; maximum volume of aggregate 5.5 cu. ft. per sack of cement.

Material	Weight per Sack in Pounds	Weight per Cubic Yard Concrete in Pounds
Cement	94	564
Sand	215	1,290
No. 3 Gravel	235	1,410
No. 2 Gravel	100	600
Water (5¾ gals.)	48	288
Total	692	4,152

Calculated for 3-inch slump. Cement factor 6.0 sacks per cu. yd. Weight of aggregate per cu. yd., 3,300 lbs. (saturated surface dry).

MIX B

For heavy reinforced sections, thin walls, columns, deep beams, 28-day strength, 3,000 lbs. Maximum aggregate 1 inch; maximum volume of aggregate 5.0 cu. ft. per sack cement.

Material	Weight per Sack in Pounds	Weight per Cubic Yard Concrete in Pounds
Cement	94	607
Sand	210	1,357
No. 3 Gravel	290	1,873
Water (5¾ gals.)	48	310
Total	642	4,147

Calculated for 3-inch slump. Cement factor 6.46 sacks per cu. yd. Weight of aggregate per cu. yd., 3,230 lbs. (saturated surface dry).

SIEVE ANALYSIS OF AGGREGATE

Sieve Size	Washed Concrete Sand	Per Cent Passing
No. 100		2.7
50		16.7
30		44.5
16		72.2
8		92.8
4		99.7
3		100.0
Fineness modulus	2.77	

Sieve Size	No. 3 Gravel	Per Cent Passing
No. 4		1.3
No. 3		2.7
¾-inch square		15.0
½-inch square		47.2
¾-inch square		79.8
1-inch square		99.7
1½-inch square		100.0
Fineness modulus	7.05	

Sieve Size	No. 2 Gravel	Per Cent Passing
No. 4		1.5
¾-inch square		1.9
¾-inch square		5.2
1-inch square		24.6
1½-inch square		90.9
2-inch		100.0
Fineness modulus	8.0	

Two admixtures are being used in the concrete. For slabs on earth and concrete walls around basement and pits, 4/5 quart of Red Label Suconem per sack of cement is added. For exterior walls and sign wings, ½ pound per sack of Plastiment is used.

Planning a Job

The Pumpcrete machine is manufactured by the Chain Belt Co., Milwaukee, Wis., and sold in the southern California territory by the Brown-Bevis Equipment Co. of Los Angeles. It is a heavy-duty single-acting horizontal piston

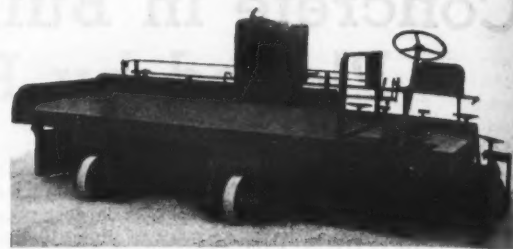
pump. Standard single-cylinder machines generally use 30-hp variable-speed electric motors or 40-hp gasoline engines. Double-cylinder machines are usually equipped with either 50-hp electric motors or 60-hp gasoline engines. Power costs for pumping concrete are approximately 2 cents per cubic yard.

The pump has inlet and outlet valves which are synchronized to open and close with the movement of the piston. On the suction stroke, concrete passes from the re-mixer through the inlet valve into the pump chamber. At the conclusion of the suction stroke, the intake valve closes and the outlet valve opens. On the forward stroke, the piston forces the concrete through the discharge valve into the pipe line. On each stroke the concrete is moved a distance equal to the travel of the piston.

Proper planning of a construction job on which Pumpcrete is to be used is of extreme importance. The plant should be so located as to facilitate delivery

(Continued on next page)

For Faster,
Easier
Road
Widening



Use APSCO Model 70

- Road widening jobs now move as fast in tonnage as full width paving.
- Widening range from two to six feet — can be increased to eight feet with extra attachment.
- Seven speeds forward, two reverse. Two engines, dual rear driving axles, mounted on pneumatic tires.
- Handles all 1½" and down materials from bituminous mix to stone and gravel.
- Write Today For Descriptive Folder.

The All-Purpose Spreader Company,

Elyria, Ohio

Where does Form-Set Rope do a better job?

(PREFORMED)

A good question—one we're often asked. Generally speaking, it does a better job wherever operating ropes pass around small sheaves and wind on small drums. Or where reverse bends are necessary. Or in other situations where added flexibility is a definite asset.

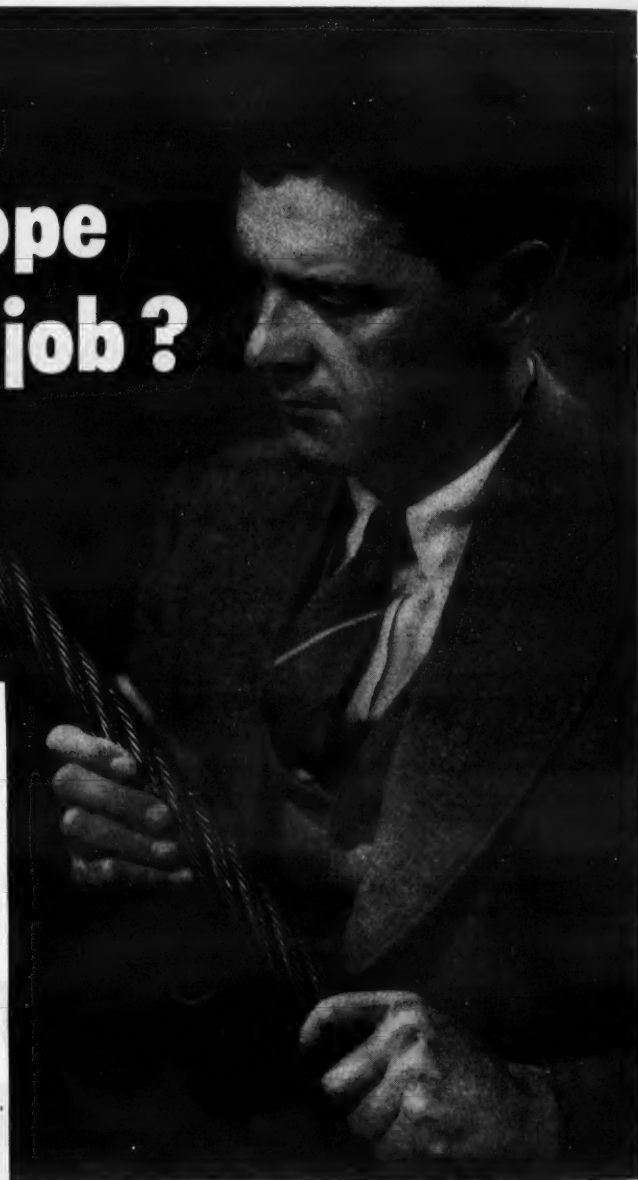
All grades, sizes, and types of Bethlehem wire rope can be furnished with the Form-Set (preformed) construction. We recommend preformed rope whenever extra performance thoroughly justifies its installation.

By extra performance we mean less kinking, better spooling, better reeving, and greater resistance to bending fatigue. The latter is especially important where running ropes must bend sharply, for preformed rope is free of pent-up internal stresses. It is "relaxed"; it does not fight itself to death.

Form-Set rope is as easily handled as a gentle, friendly dog. Yet it's tough, too—and it l-a-s-t-s.



Section of Form-Set (preformed) rope. The displaced strands shown here have been lifted out by hand; they cannot pop loose by themselves, even when cut or broken.



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

When you think WIRE ROPE . . . think BETHLEHEM



A close-up of the Rex Pumpcrete which placed 15,000 cubic yards of concrete in the new May Co. store in Los Angeles.

Concrete in Building Placed by Pumping

(Continued from preceding page)

of concrete to it and to minimize the length of discharge lines. Lines should be laid on a route that is the shortest one possible, that will least interfere with other construction operations, and that will require the least amount of moving as work progresses.

The alignment should be reasonably straight. Sharp bends should be avoided wherever possible, as the power required to pump through a 90-degree bend is equivalent to the power required to pump 40 feet in a straight line. Anchors must be provided at all bends to prevent the thrust at those points from displacing the line.

Concrete placing for any particular pour should start at the point farthest from the Pumpcrete plant and progress towards the plant. This will allow pumping to go on continuously, as sections of pipe may be removed from the end of the line without halting operations. Placing of pipe supports over fresh concrete is eliminated in this manner, and plant output is increased.

The normal operating crew for pumping concrete consists of an experienced operator with a helper to run the plant. Just prior to pumping concrete, it is advisable to pump a batch of mortar consisting of 1 part of cement and about 3 parts of sand and pea gravel to lubricate the walls of the pipe. One cubic yard of mortar will lubricate about 1,000 feet of 8-inch line. The first two batches of concrete following the mortar should have about 6 inches of slump. Thereafter, the normal mix for the job can be used to the completion of the pour. When using ready-mixed concrete, the hopper should be kept full, in order to have a reserve. The level of concrete in the re-mixer should always be kept above the agitation shaft; this will prevent air from entering the pump chamber, becoming trapped in the line, and eventually causing stoppage. A signal system to inform the operator to start or stop pumping is essential.

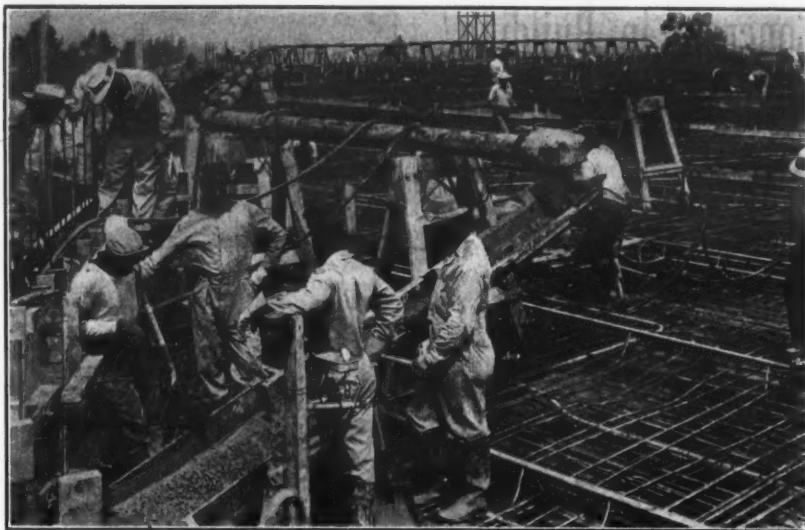
An all-important factor is the steady flow of concrete, as it sets the pace for other construction. A good operator who understands the characteristics of the equipment is essential to the success of a concrete-pumping job. Obviously, if the equipment is to function properly, its maintenance is extremely important. Generally, about 10,000 to 15,000 cubic yards of concrete can be pumped between major overhauls of equipment, and 100,000 yards pumped before pipe-line wear becomes noticeable. Pipe wear is actually very slight, owing to the low velocity of flow.

Upon completion of a pour, a plug is inserted into the pipe line just forward of the discharge valve. It consists of a "go-devil", which is a barrel-shaped

object with a rubber cup on each end, preceded by a wad of wet burlap or paper cement bags. This plug is forced through the line either by compressed air or by water pumped through it by the Pumpcrete. The re-mixer should also be emptied of concrete at completion of a pour and flushed clean with water.

Design of Mix for Pumping

Probably the most important single consideration in the pumping of concrete is proper design of the mix, with emphasis on gradation of aggregates. It is a common misconception that concrete for pumping must be wet—that is, have a high slump. This is decidedly not a factor. In fact, free water in concrete to be pumped is a serious obstacle. On the other hand, it is possible to pump concrete of proper mix design with slumps as low as 1 inch. Practically any grade or quality of concrete can be pumped satisfactorily provided the mix is properly designed. Mixes that are poorly graded, and those containing



A movable chute at the end of the Pumpcrete 8-inch pipe line facilitated placing concrete anywhere in the structure.

porous or highly absorptive aggregate or aggregates too large for the equip-

ment to handle, have given trouble. (Concluded on next page)

**THIS ABLE-BODIED WORKER
NEVER MISSES A DAY!**

THE MODEL "M" Dorsey MACHINERY TRAILER

with Built-In **DURABILITY
DEPENDABILITY
ECONOMY**



The rugged Dorsey Model "M" Machinery Trailer does big jobs in a big way! No breakdowns!—no delays!—skilled Dorsey engineering specifies only high-quality materials and master craftsmanship . . . resulting in 3 outstanding features that make Model "M" operation—

Dependable!—the Model "M" is always on the job . . . a gold-star workman putting in a full day's work every day for your greater profit!

Durable!—the Model "M" takes any hauling job in smooth, easy stride . . . from 15 to 25 tons!

Economical!—the Model "M" combines *Durability and Dependability* to give fast, low-maintenance heavy machinery transportation—any and every time you want it!

Ruggedly built for steady service . . . promising a long, uninterrupted work-life . . . The Dorsey Model "M" Machinery Trailer boasts—

Positive Action Brakes to assure Passenger Car control—and safety!

Patented Tubular Trunnion-type Axles to absorb road shocks and ease wear and tear on the trailer!

A Frame Sturdily Constructed to give you year after year of trouble-free service!

Write TODAY for Dorsey Bulletin 8210!

**15 TON
20 TON • 25 TON**

In the Model "M" group of 15-ton, 20-ton and 25-ton capacities, there is a Dorsey hauling unit well adapted to your requirements. So, to lighten your heavy hauling problem, check today with your nearest Dorsey dealer or distributor. Save—by studying the *Modern Designed Transportation* advantages built into the Dorsey Model "M" Machinery Trailers!



**DORSEY
TRAILERS**

ELBA, ALABAMA, U.S.A.

Concrete in Building Placed by Pumping

(Continued from preceding page)

Proper concrete mortar possesses good cohesive properties which, in pumping, support the coarse aggregates at the center of the pipe. Consistency, plasticity, and density govern the distance concrete may be pumped.

Quality and grading of sand play an important role in the pumping of concrete. The most favorable sand for pumping is that in which 15 to 20 per cent passes a No. 50 screen; 3 per cent of this amount passes a No. 100 sieve; and the coarser sizes are properly proportioned. However, thousands of cubic yards of concrete with sand of a coarser size have been successfully pumped.

Gravel is favored over crushed rock as a coarse aggregate in pumped concrete, owing to its lesser surface area and its smaller percentage of voids. However, a well graded cubical stone of normal specific gravity and low absorption is entirely satisfactory. Flat-breaking angular stone is not desirable as a coarse aggregate, for it necessitates closer control of grading, proportioning, and mixing.

Porous aggregates, such as cinders and those produced from burned clay or from lava rock having a large percentage of voids, will tend to dry up a mix. They may stiffen it to a point where pumping becomes extremely difficult. This is because compressive action of the pump forces water into the pores of the aggregate, thereby drying up the concrete. Consequently, if an initially dry mix is being used, such further loss of moisture under pressure may result in impossible pumping.

It may be generally stated that for conditions favorable to pumping, concrete mixes should follow a smooth grading curve. They should have no excessively flat or steep sections, and should contain sufficient fineness to prevent particle interference for the particular cement content. It should be noted that no amount of pressure will pump stone, gravel, or sand unless (1) the particles are contained in a properly graded mixture with just sufficient liquid to make it fluid, or (2) as in the case of concrete, the aggregates become a part of a semifluid mass by the cohesiveness and lubricating properties of the cement mortar.

Costs

Reliable cost data on pumping concrete have been compiled. They show that this method of concrete placement compares favorably with other methods on a wide range of projects.

It should be relatively simple for any contractor to estimate closely concrete-pumping costs on any job, provided he can foresee or eliminate such present-day variables as changes in wage rates and material prices.



Gears, clutches, brakes, and drums are eliminated on this 2-ton truck crane. A hydraulic system operates the entire unit.

2-Ton Truck Crane Is All-Hydraulic

A 2-ton crane that employs full hydraulic control for every operation is now being made under the trade name of Hydro-Crane by the Milwaukee Hydraulics Corp. A simple high-capacity hydraulic system operates the entire unit—boom, hoist, swing, and the clamshell bucket. The standard tubular boom raises and lowers as well as tele-

scopes from 16 to 22 feet under hydraulic power. This, the manufacturer explains, enables the operator to spot loads quickly and accurately, reach into boxcars, over walls or piling, between beams, or into buildings. A 360-degree swing is provided. Hydraulically powered outriggers are designed to provide stability. They can be independently extended or retracted both horizontally or vertically in 3 to 5 seconds, from the operator's seat.

The Model H-2 mounts on a 1½-ton truck or on special 6 x 6-drive jeeps available at the factory. For clamshell service a standard ¼-yard bucket, hydraulically powered, is available as well as a hydraulic low-headroom bucket for congested quarters. The H-2 was designed for small-scale jobs, ordinarily requiring slow and costly hand-labor methods.

Further information may be obtained by writing the company, P. O. Box 2612, Milwaukee 14, Wis. National distribution is planned and distributor appointments are now in process.

Portable Steam Boiler

A small steam boiler of the Scotch marine type is described in a bulletin issued by Kewanee Boiler Corp., the manufacturer, as a self-contained, internally fired cylindrical steam generator. The furnace extends full length from front to rear head well below the water level under the return tubes; its entire circumference is surrounded by water.

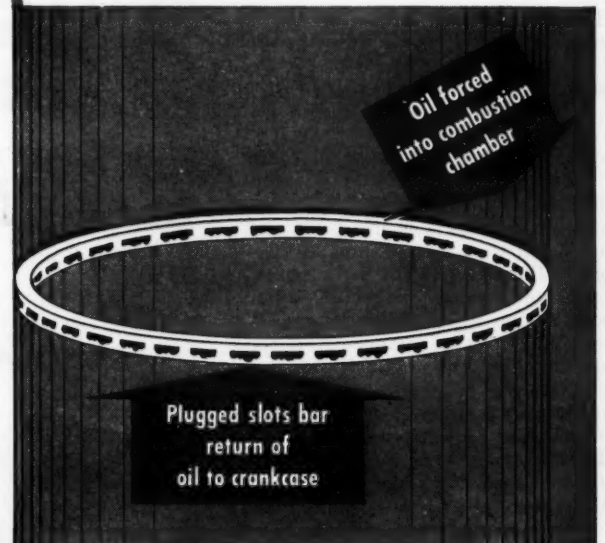
This Scottie Junior series is brought out in 6, 9.9, 15, 20, 25, and 30-hp sizes. The various models are rated at from 840 to 4,200 square feet of steam radiation. They will operate on coal, oil, gas, or mechanical stoker. All boilers are mounted on skids and equipped with handholes.

The bulletin describes features and specifications, and includes a blueprint showing the major construction features. This bulletin may be obtained by writing to the Kewanee Boiler Corp., Kewanee, Ill. Mention this news item and request Catalog 99d.

Diesel Engine **DANGER** points

Plugged Oil Slots Increase Oil Consumption

When carbon and gum formations clog oil-ring slots, the oil which would normally return through these apertures to the crankcase is forced into the combustion chamber. Here it joins the other products of combustion which "coke" on the ring belt area cementing the rings in their grooves and aggravating the clogged condition of the ring slots.

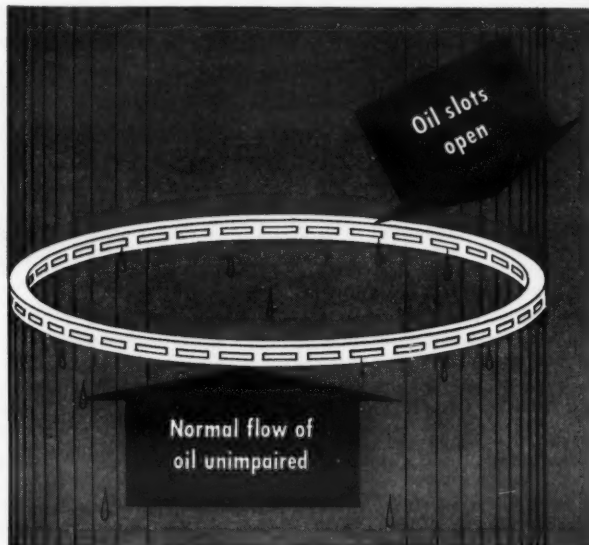


RPM DELO Oil keeps oil slots open, prevents stuck rings

RPM DELO Diesel Engine Lubricating Oil is compounded to prevent engine deposits these three ways:

1. An oxidation inhibitor reduces the formation of gummy particles which form the binder for carbon deposits.
2. A detergent prevents deposits forming on rings and pistons, keeping engines cleaner.
3. A dispersive agent insures removal of this material when the oil is drained.

Other compounds in RPM DELO Oil minimize hot-spot wear, prevent corrosion, eliminate foaming.



USE RIGHT BUCKET FOR THE JOB



Hayward makes all three—clamshell, electric motor, orange peel. A Hayward recommendation is unbiased.



THE HAYWARD CO., 32-36 Day St., New York

Hayward Buckets

To match the fine performance of RPM DELO OIL, use these equally efficient companion products from the same famous "RPM" line—RPM HEAVY DUTY MOTOR OIL—RPM COMPOUNDED MOTOR OIL—RPM GEAR OILS AND LUBRICANTS—RPM GREASES. For additional information or name of your distributor, write any of the companies below:

STANDARD OF CALIFORNIA • 225 Bush St., San Francisco 20, California
THE CALIFORNIA COMPANY • 17th and Stout Streets, Denver 1, Colorado
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THE CALIFORNIA OIL COMPANY • 30 Rockefeller Plaza, New York 20



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Ford trigger-fast engine starting often amazes first-time owners. It's mighty satisfying, but not nearly so important as Ford *fast warm-up*! Water does not circulate through the radiator until the engine is well warmed. This speeds the heating of water, cylinder block and oil. Hot exhaust gases

are used to heat the intake manifold, speeding vaporization of fuel and minimizing crankcase oil dilution. Both these features reduce wear on cylinder walls, pistons, rings, bearings and valve mechanism. Yes, winter is tough on any truck, but Ford Trucks are engineered to take it.



Ford Heavy-Duty 2-ton, with dual-range rear axle and 6 x 8-foot Hydraulic Hoist Dump Body by Gar Wood Industries, Inc., Detroit, Michigan.



ONLY Ford Trucks offer you *ALL* these long-life features: your choice of two great engines, the 100-H.P. V-8, or 90-H.P. Six—Flightlight aluminum alloy 4-ring oil-saving pistons—weatherproofed, Hi-Volt ignition—full pressure lubrication—axle shafts free of weight-load, even in light duty units—heavy channel section frames, *doubled* between springs in heavy duty models—big brakes, with non-warping, score-resistant cast drum faces—all told, *more than fifty* such examples of Ford endurance-engineering.

No wonder that Ford Trucks Last Longer! No wonder that 7 out of 11 of all Ford Trucks built since 1928 are still at work! No wonder the average age of all Ford Trucks on the job is nearly 9 years! And no wonder your Ford Dealer is calling for ever-increasing truck production schedules in Ford factories! Get *YOUR* order in now!

FORD TRUCKS

MORE FORD TRUCKS IN USE TODAY THAN ANY OTHER MAKE

Rolling Repair Shop For Heavy Equipment

Truck-Mounted Vans Hold Machine Shop and Parts for Dirt-Movers of Contractor on Railroad Job

AN equipment-repair shop with a supply of spare parts is a reality on the A. Guthrie Co., Inc., contract for the western half of the new Northern Pacific Railway relocation. (See article on page 1). Moreover, the Guthrie shop and spare-parts warehouses are all mounted on old moving vans, and they can and do go wherever the heavy equipment is located.

Since the company has standardized on Caterpillar tractors, one van holds nothing but the parts for those machines. Another van has bins only for LeTourneau Tournapull parts. Still another van contains a Gregory 12-inch machine lathe, a bench grinder, a Sioux drill press, and welding equipment. All these vans are mounted on old White trucks. The machine shop even has room enough for a Stokes-Sebastian 20-inch machine lathe, and has turned out delicate connecting rods for a 7½-cfm Briggs & Stratton-powered air compressor in an emergency. Big steering clutch drums for D8 Caterpillar tractors are regularly built up by welding and then turned down to final dimension on this lathe.

To those dirt-movers who scoff at the idea of a lathe on a construction job, Master Mechanic U. M. Lundin says that more than once the tool has been almost worth its weight in gold when a hard-to-get part was not available. Lundin himself is an expert machinist and has turned out some of the really fine work to come off this lathe.

Whenever a spare part is used out of one of the bins in the other two trucks, it immediately goes on order and a follow-up is then made on the order. Parts which seem to wear rapidly are, of course, ordered in greater quantities than those which last and last.

On the western half of the Northern Pacific Railway job between New Salem and Kurtz, Lundin and his brood of moving vans made "camp" four times in a space of 60 days. Moving the shop and parts close to where the heavy equipment is working saves travel time in case a machine breaks down. This set-up takes care of about 45 pieces of construction equipment and keeps them on the line, at work.

And when a job is finally finished, there is no time lost loading up the spare parts that are left. The vans simply start up and are loaded on flat-cars to the home office or the next job. The Master Mechanic, incidentally, is his own storekeeper, for he holds the keys to the other vans.

The houses over these vans were built out of plywood, and have durable composition roofs. All parts are kept safely out of rain and bad weather. But what is most important about the units is their mobility. When they are urgently needed they're almost sure to be there.

Metalweld Adds to Line

It has been announced that Metalweld, Inc., 26th and Hunting Park Ave., Philadelphia, Pa., has been appointed exclusive distributor in the eastern Pennsylvania, southern Jersey, and Delaware area for the entire Worthington-Ransome Blue Brute line. The firm has previously handled Worthington portable air compressors, rock drills, air tools, and accessories. It now rounds out the line with concrete pavers, truck-mixers and agitators, portable mixers, pneumatic placing equipment, grout injectors, and concrete guns.

With a long business record of maintaining and operating a large fleet of



C. & E. M. Photo
A mechanic repairs a tractor in the equipment yard on the Guthrie job. In the background are two portable vans containing machine-shop equipment and spare parts.

rental equipment, Metalweld continues as exclusive distributor for Byers cranes and shovels, Novo pumps and hoists, and Hetherington & Berner asphalt mixing plants. Other lines are Macwythe wire rope, Archer tower equipment, and Yaun buckets. Metal-

weld also specializes in heavy-equipment maintenance, welding, machine-shop work, boiler repairs, metal spraying, and corrosion protection.

S. John Oechsle heads the Metalweld organization; John Norris Childs is Vice President; and M. L. McIntire is Sales

Manager of the Construction Equipment Division.

Pruning Tools Serve Roadside Maintenance

Pruning tools for roadside-maintenance needs are listed in a catalog issued recently by H. K. Porter, Inc. The firm makes one-hand pruners for close work, four two-hand sizes for medium duty, two heavy-duty units for cutting wood of 1½ and 2-inch diameter, and a number of pole pruners for tree trimming. Long-arm or short-arm pole pruners are supplied, with either solid or jointed poles, with or without pulleys.

Heat-treated steel blades, sharpened to cut easily, feature these pruners, Porter says. The various parts are machined for accuracy.

H. K. Porter will be glad to send roadside-maintenance engineers a copy of catalog sheet 410. Mention this notice when writing the firm at 6 Ashland St., Everett 49, Mass.

when you buy an asphalt

1 The Cedarapids Model "A" — is a knock-down type, hot-mix, 1,000-lb. batch, portable asphalt plant built to handle medium-sized black top jobs at a profit. 3' x 6' Cedarapids-symbols screen, 1,000-lb. capacity pug mill, 2' x 10' drier.

2 The Cedarapids Batch-master — is the handiest, low-cost, portable, continuous-mix type asphalt plant you ever saw for handling small quantity runs of patching aggregate. Capacity up to 30 tons an hour. Bulletin PM.

3 The Cedarapids Model "T" — is a big capacity, portable asphalt mixing plant that combines accurate batching, thorough mixing, portability and quick assembly. 3,000 or 4,000-lb. pug mill capacity. Ask for Bulletin AP-11.

4 Cedarapids Driers — are available in all standard diameters and lengths to fit every drier need. Gasoline, diesel or electric powered. Portable or on skids. With or without fuel oil heater sets. With or without dust collectors. Ask for Bulletin AP-5.

5 The Cedarapids Model "FA" — is our most portable, high capacity batch-type asphalt mixing plant. Can be set up ready for operation in a matter of a few hours. 25 cu. ft. capacity. Gasoline, electric or diesel power. Bulletin AP-FA.

6 The Cedarapids Pug Mills — are offered in 1,000, 2,000, 3,000 and 4,000 lb. capacities. "Nihard" pug rollers are reversible and replaceable. Screen, air or manually-operated gates. Available with or without steam jacks. Bul. AP-4.

IOWA DEALERS

Iowa Dealers are qualified by training and experience to help you get real low-cost production in your crushing, screening and asphalt mixing operation — to recommend and sell equipment that will enable you to meet the strictest specifications at a good profit — and service your equipment to assure the minimum of lost time. There's a Cedarapids dealer in almost every important city ready for your call.

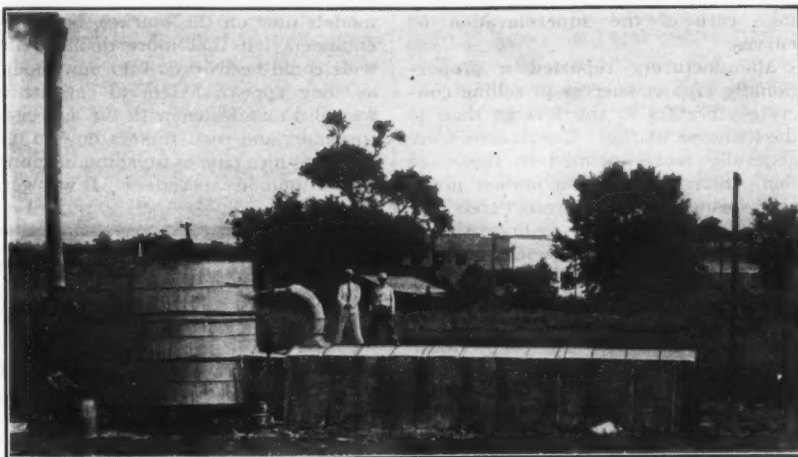
IOWA MANUFACTURING
CEDAR RAPIDS, IOWA, U. S. A.

Plant for Treating Lumber With Rosin

A lumber-treating plant, for use in applying Pinola wood preserver, has been devised by J. W. Carr, developer of the liquid rosin preservative. One such plant has been built for The Savannah Wood Preserving Co.

Sap pine can be made almost the equivalent of heart pine with the use of Pinola and the new treating equipment, the Pinola Co. says, since Pinola impregnates the sap pores with rosin and fatty oils. The sap pine is then said to take on the appearance and durability of heart lumber.

The new plant comprises a vat into which 10,000 feet of green lumber is loaded. The timbers are covered with Pinola, steam is turned on, and they are cooked until all moisture has been extracted. The vapor travels through a worm and cap arrangement, is condensed, and comes out as water, turpentine, and Pinola; the last two are siphoned back into the storage tank.



New equipment has been developed for use in treating sap pine or other lumber with Pinola wood preserver.

When the timbers have been cured and the moisture extracted, the hot Pinola remaining is allowed to flow from the vat to an underground tank. Cold Pinola is then poured in, cooling

the lumber and impregnating its pores. Complete details about this new wood-treating plant and about Pinola can be obtained from the Pinola Co., P. O. Box 1262, Savannah, Ga.

Equipment Discussed At 2-Day Conference

Manufacturers, Contractors, and Engineers Hold Joint Sessions on Need for New Machinery

A JOINT committee of the American Road Builders' Association and the Highway Research Board sponsored a two-day conference in Washington, D. C., on Oct. 23-24. Engineers, manufacturers of construction equipment, and contractors attended to discuss the equipment needs of the construction industry, with emphasis particularly on highway and airport work. The conference was divided into four sessions, and was attended by 125 representatives from fifteen different states.

The purpose of the gathering was to acquaint manufacturers with the exact needs and requirements of engineers and contractors. Armed with that information, it was felt, they can design and develop improved machinery for constructing better highways, airports, and other such public works faster and at lower costs. From such liaison, all segments of industry are expected to benefit. With the manufacturers supplying machinery fitted to the precise wants of contractors, engineers can expect their specifications to be more easily followed. Also, with cooperation between these three factions, the possibility of a manufacturer bringing out a piece of machinery that will not be popularly received is remote. Thus he will save time and money.

The results of this meeting naturally will not be felt immediately, but its effects have long-range possibilities. Manufacturers are retarded in development work by the shortage of engineering man-power. They report that there is a serious need for draftsmen and designers, and that these positions are very hard to fill, with prospective employees all wanting to be salesmen. Moreover, they say, present orders for equipment will account for all production well into 1948. Not until this backlog of shortages is filled will they have the time and the factory space to devote to the development of new designs and models. However, they were of the unanimous opinion that time, energy, and money will be saved from the interchange of ideas and information with engineers and contractors when they do start thinking about new equipment.

The morning of the first conference day was given over to a discussion of the equipment used in concrete paving. It was followed in the afternoon by a session on bituminous-paving equipment. On the morning of the second day, the excavation, moving, spreading, and compaction of earth and rock were the topics. And at the afternoon meeting, the results of all these sessions were summarized.

Concreting Equipment

Led by Charles W. Allen, Research Engineer, Ohio State Highway Department, Columbus, Ohio, the morning session covered all aspects of concrete-paving equipment. Contractors and engineers stated what they wanted, and manufacturers described new designs and new efficiency. Everything from the shaping of the subgrade to the finishing of the concrete came within the scope of this session. One manufacturer mentioned a new power subgrader in the process of development that will shape the subgrade by a vibratory method. Another manufacturer told about a new accessory to go into aggregate-bin compartments which will eliminate the segregation of material.

On the subject of road forms, the
(Continued on next page)

plant . . .

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Cedarapids
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2

4

6

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Unitized Plants

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COMPANY

we also make a complete line of portable crushing and screening plants and mobile units for every quarry and construction project.

Equipment Discussed At 2-Day Conference

(Continued from preceding page)

consensus expressed was that the present types are satisfactory, but that deeper forms will be needed to take care of thicker slabs. One manufacturer reported that forms 25 inches deep are now being made for use on an airport runway. The trend in form construction has been towards heavier sections; practically all forms are now manufactured from 1/4-inch stock, with the base the same dimension as the height in order to provide solid bearings on the subgrade.

Another manufacturer reported that with the use of granular sub-base, stakes 30 inches long instead of 18 inches should be used to support and hold the forms in place. This is essential, he contended, to prevent lateral movement of the forms when the spreaders and finishing machines pass over them.

Both pavers and truck-mixers were discussed next, under concrete paving, and the growth of the concrete paver in recent years from the 21-E to the large dual-drum 34-E paver was described. Some felt that the ultimate had been reached in paver size, and that machines of greater weight should not be supported on the subgrade. A few engineers asserted that it was difficult to discharge the concrete quickly from these large pavers. They felt that perhaps a faster sequence of concrete operations could be obtained with a continuous concrete mixer. Nothing has been done on such a design however.

Other engineers stated that a central batch plant offered the best solution for speedier concreting, and that the concrete should be carried to the forms either in truck-mixers, or in light dump trucks if the concrete was mixed at the central plant. This latter method was said to have possibilities, particularly with the use of air-entraining cement to prevent segregation. With a possible trend towards longer paving contracts on express highways now being built, both contractors and manufacturers felt that the economy of hauling batches over long distances would decide the choice of paving equipment.

Concerning both types of mixing, many felt that the controls over the operations could be improved, particularly with reference to ready-mix concrete. Some manufacturers said that state highway departments should be more consistent in their mixing specifications. They pointed out that the mixing time for pavers now varies from 50 seconds to 120 seconds per batch in different states. The majority of highway departments specify a mixing time of 60 seconds per batch. In truck-mixers, 40 revolutions are usually required.

As a result of greater concrete production with the present large pavers, the general opinion was that the use of spreaders has become practically a "must". Spreaders were considered indispensable when ready-mix concrete was being used. Their use eliminated the segregation of concrete which was usually induced by the puddlers, and practically did away with this back-breaking job. It also speeded up production.

The unanimous opinion also was that finishing machines, both the transverse and longitudinal variety, are essential, and that with these machines, hand-finishing should be kept to a minimum. One manufacturer reported that he was bringing out a new, small, lightweight finishing machine to be used on concrete widening strips. Another manufacturer reported a 2-screed finishing machine in which the second screed could be set at a 15-degree angle to

take care of the superelevation on curves.

Manufacturers reported a proportionally greater success in selling concrete vibrators to the foreign than to the domestic market. Contractors were generally more inclined to their use than engineers; this inclination probably springs from the present trend towards dry concrete, as vibrators help to make a mix more workable. All agreed that vibrators should not be used with a wet mix, however. One state highway department reported that a test road built with the use of vibrators had a better riding surface and also more durable concrete than a similar test road constructed without vibrating the mix.

Bituminous Equipment

George H. Dent of The Asphalt Institute conducted the afternoon session on bituminous equipment. Bituminous distributors was the first topic under discussion. Most engineers and contractors reported satisfaction with the

models now on the market, but a few engineers felt that more definite controls could be worked into new models as they appear. General satisfaction was also manifested with the aggregate spreaders and road-mixers now in use. This was also true of finishing machines and bituminous spreaders. It was gen-

erally felt that these machines, if properly operated, could do their work satisfactorily without the use of rakers, shovelers, or lute men.

A need for better driers at bituminous plants was expressed. One manufacturer reported that the largest drier

(Continued on next page)

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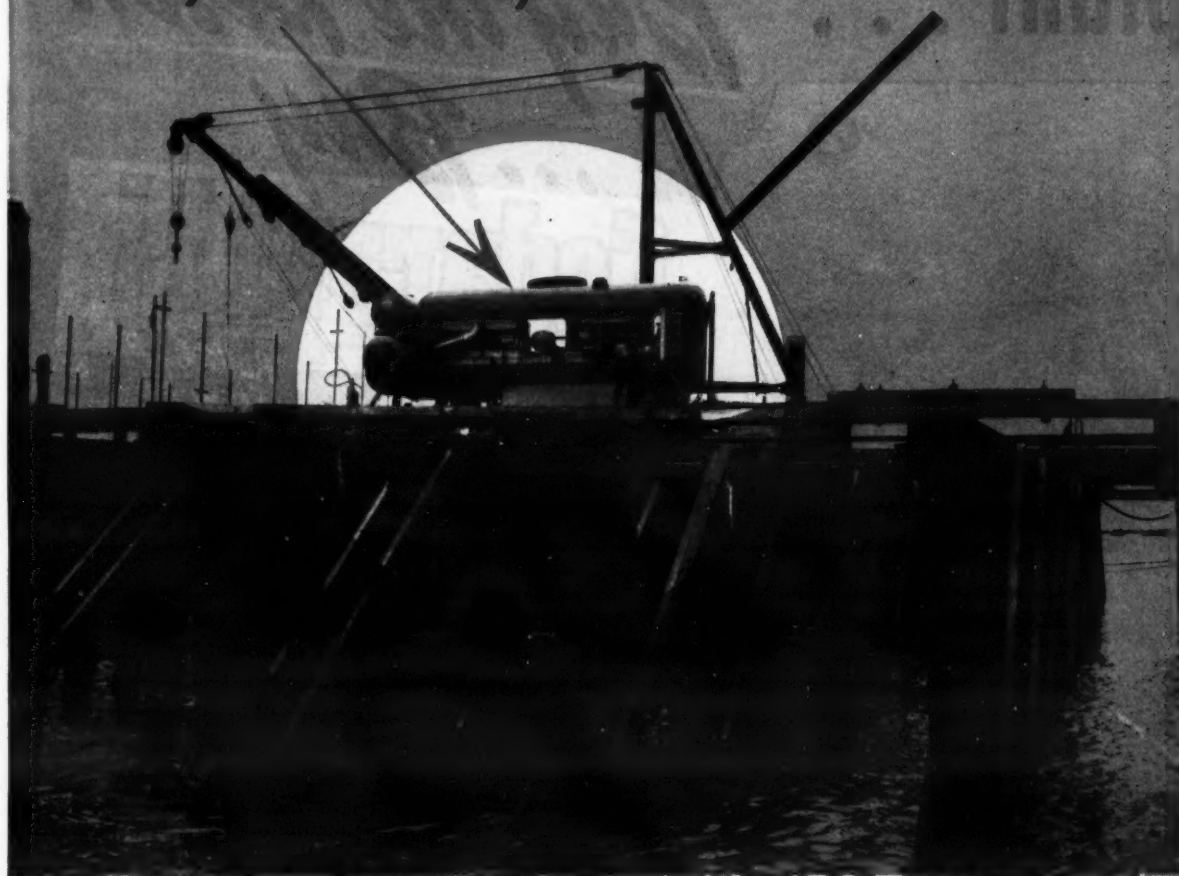
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Equipment Discussed At 2-Day Conference

(Continued from preceding page)

he made was 72 inches by 24 feet. But he felt that there was a market for larger driers, particularly in the southern states where the clay content of the soil is high, and where a moisture content of 12 per cent is not unusual. Representatives from one state highway department reported that they would like to see a special type of continuous-mixing plant brought out to suit their own particular needs. However, a manufacturer stated that the particular plant they had in mind was highly specialized; that manufacturers could not build such a plant for only one user; and that they would have to design a plant that would fill the requirements of 85 to 90 per cent of their customers to warrant such production.

Several highway-maintenance engineers stated that they needed a small portable bituminous plant for maintenance purposes that would produce from 20 to 50 cubic yards of material a day. This machine should not be a modified concrete mixer but a real black-top plant-mixer equipped with a drier. One manufacturer reported the development of such a small-type pug-mill mixer but without a drier. Another stated that his company was working on a small mixing plant with a 3 to 5-ton per hour capacity, complete with drier.

With reference to rollers on bituminous work, the consensus was that tandem rollers were preferred to the 3-wheel type, and that the newer 3-axle tandem rollers were also being widely used. Specifications of highway departments as to rolling are a little vague, according to some contractors and manufacturers. One state limits the laying to not more than 30 tons of plant-mix per hour when only one roller is working.

Earth-Moving Equipment

The morning of the second day was given over to a discussion of earth-moving equipment under Group Chairman Professor Kenneth B. Woods, of Purdue University, Lafayette, Ind. The first topic for discussion was excavators, which included shovels, backdiggers, clamshells, draglines, and cranes. General satisfaction was expressed with the equipment now available, but manufacturers promised more improvements to increase the speed of the swing and to give better traction. Several maintenance engineers approved portable loaders that pick up from shoulders the material pulled from ditches and load it into trucks. Some manufacturers also reported progress on the development of new larger tractors and accompanying scrapers for dirt-moving and spreading. They mentioned the development of a new rubber-tired tractor with dozer attachment.

The major portion of this discussion was given over to the need for soil-compaction equipment. One manufacturer reported a new machine for vibratory compaction of soils that will be announced shortly. This machine will weigh 30 tons, will be floated on two large 24-inch-cross-section tires, and will have up to 1,500 vibrations per minute. The pressure in the tires will be variable, with a maximum of 125 pounds to the square inch. This machine is aimed to produce depth compaction, without lateral displacement of the soil, to obtain the maximum density. The manufacturer said that his company would spend from \$25,000 to \$30,000 in building an experimental model.

New equipment was needed in the compaction of backfilling for trenches, according to several engineers. Most of

the representatives felt that the pneumatic tampers now available were satisfactory for compacting thin layers of soil in trenches. But they thought other equipment was required if material was to be compacted in 6-inch layers or greater.

Particular Problem

One contractor mentioned his need of a device for unloading bulk cement and distributing it on a soil-cement stabilization project. This job was a large contract where 1,500 barrels of cement were handled a day. The contractor maintained that there was no portable equipment now on the market to unload cement at the rate of 250 to 300 barrels per hour, and to store it in portable bins which could be moved along to

follow the soil-stabilizing machine. Because of the labor situation, he could not use bag cement and had to use the bulk variety. As the job was spread out over a considerable area, the common type of cement bin with the screw-unloading device and elevator was not suitable. Manufacturers were interested in this problem of unloading bulk cement and transporting it to the stabilizing unit. They pointed out that while soil-cement stabilization is usually considered to be low-cost work, it does not necessarily follow that such work can or should be done with low-cost equipment. High-cost equipment is often a necessity in performing low-cost work.

The two-day conference came to a conclusion with a summary of the three

other sessions. Manufacturers, contractors, and engineers all felt that the trend to more and specialized equipment was necessary, particularly with the increasing high cost of labor. The general opinion was that labor needs to be trained more in the use of the new equipment, in order to get the best possible results from its use. Poor operation means less control over the machinery, and results in inferior work and consequently higher cost. One manufacturer has launched a training program not only for the equipment operators, but also for inspectors and engineers from the highway department so that they may become acquainted with the machines and know how to operate them efficiently.

(Concluded on next page, Col. 4)

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Dual Highway Made By Adding New Lane

Ground Water Retarded Grading, Necessitating Large Pipe Footage for Concrete-Road Drainage

THE contractor grading the new half of a dual highway near Norfolk, Va., often found his operations retarded. After a rain the rising water table was slow to fall and he had to wait until the soil in this low flat coastal area dried out enough so that fills could be compacted to maximum density at the optimum moisture content. Work on this widening of State Route 13Y started before V-J Day, in July, 1945. It was probably the last wartime access-road project. Although the war ended soon after, the need for the extra road width was so great that the job was completed as originally planned.

The improvement on 13Y begins at the east boundary of Norfolk. It extends for 2.2 miles to connect with U. S. 13, which continues to the great new Naval Base of Camp Bradford overlooking Chesapeake Bay near Hampton Roads. The Virginia Department of Highways, with the cooperation of the Public Roads Administration, drew up and awarded a contract for this job to the Southern Equipment Co. of Norfolk, Va., on its low bid of \$202,193.51. A feature of the construction was the installation of over 3,000 feet of drainage pipe and 23 drop inlets. These were required to drain a road which has an elevation only a little above sea level.

The original road, now used as the westbound lane, is a 23-foot concrete pavement, 7 inches thick. It had been widened from 16 feet in 1939 and then covered with a thin course of blacktop. The new lane for eastbound traffic is built on the south side of the old road on right-of-way secured mostly from a Federal housing project. Separating the opposing lanes of traffic is a grassed median strip of variable width up to 20 feet; its center is depressed below the center-line elevation of the adjoining pavements. Where space did not permit the separation of the two lanes, the new concrete was poured alongside the old pavement to make a 46-foot road. In these locations the

new pavement consists of an 8-inch concrete base course which, together with the original road, was topped by two 1/2-inch courses of bituminous concrete. This type of surface was used because of the greater safety factor induced by uniformity over any particular section of highway.

Otherwise the new pavement consists of a 23-foot reinforced-concrete slab, 9 inches thick; it has a straight slope from the center of 1/8 inch to the foot, and is flanked by 8-foot shoulders pitched 3/4 inch to the foot. Ditches are 15 inches deep with the backslopes 2 to 1. Where the subgrade was found inadequate to serve as a foundation for the new concrete, it was removed. A 6-inch layer of granular borrow was spread over the roadbed. It extends out to the shoulder line at the ditch on one side, and 1 foot beyond the pavement towards the median strip on the other.

Grading Operations

Because of unfavorable weather and the general wetness of the ground, grading was halted towards the close of 1945 and was not resumed until April, 1946. The cuts and fills balanced, with the hauls ranging from 500 to 1,000 feet. No rock existed in this locality, so the entire earth-moving was done by two LeTourneau 10-yard scrapers pulled by Caterpillar tractors. An International tractor, with a Bucyrus-Erie blade, served as a pusher in loading. It also pulled around a LaPlant-Choate dual-drum sheepsfoot roller to compact the fine-clay fills. Two power graders, a Caterpillar and a Galion, spread the fill material in 6-inch layers.

Over most of the route the new alignment paralleled the old, with the exception of one location where a sharp 20-degree curve was flattened to a 5-degree curve. The new construction also entailed some work for the Chesapeake & Potomac Telephone Co. which had to move its pole line back on the south side of the road from 40 to 60 feet. The Virginian railroad, which crosses the highway at grade near the west end, also had to adjust its grade at this point to meet the new pavement.

At each end of the project where the old and new pavements converge, the

old concrete was broken out in the interest of improved alignment. A P&H crane with a 30-foot boom and a 1,000-pound weight made rubble of the slab, which was then removed for a 350-foot stretch at the west end and for 1,500 feet at the east end. The subgrade material to serve as the paving foundation was taken from a borrow pit near the Little Creek Ferry, 2 miles from the east end of the job. It was spread and compacted in a 6-inch layer.

Pipe Drainage

During the installation of the large footage of drainage pipe, a problem arose from the presence of a 30-inch water main which runs lengthwise of the highway and carries water to Norfolk from the water works east of the city. The water main nearly always was at the same elevation as the larger-sized concrete pipe which was to be laid across the road for cross drainage. This problem was solved by constructing a manhole to permit the flow of storm

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Equipment Conference

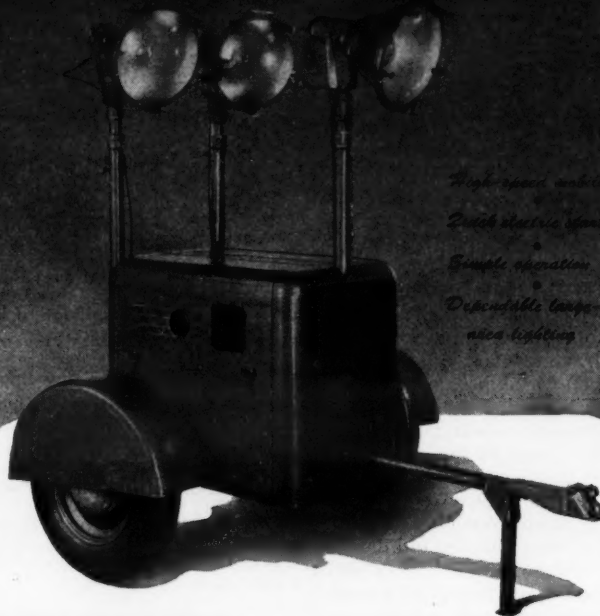
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The conference representatives from the construction industry were entertained at dinner the first night with an address by Captain R. D. Kase, Corps of Engineers, U. S. Army. The subject of Capt. Kase's illustrated lecture was "Captured Equipment From the European and Asiatic Theaters of War". H. F. Clemmer, Engineer of Tests and Materials, District of Columbia, Department of Highways, is General Chairman of the Joint Technical Committee.

Mall Celebrates 25 Years

Its 25th anniversary in the manufacture of portable power tools is being celebrated by the Mall Tool Co. of Chicago. Established in 1921 in Milwaukee by A. W. Mall, the firm moved to Chicago in 1922. There it has now expanded into a plant covering 300,000 square feet of manufacturing space.

This New Onan FLOODLIGHTER



NIGHT OPERATIONS are easier, faster, safer... with the mobile Onan Floodlighter. Special dolly mounting permits quick hitching and high-speed towing. On location, the Floodlighter is easily moved, operated and serviced by one man.

Three 1000-watt lamps, enclosed in spun aluminum reflectors, provide brilliant illumination for airport runways, loading ramps, aprons, outdoor depots and construction sites. Rugged, weatherproof, sheet-steel housing protects the 3000-watt A.C. power plant. The prime mover is an Onan air-cooled gasoline engine direct connected to the generator for maximum compactness and permanent alignment. Quick and sure push-button electric starting.

Motor-driven tools and auxiliary lights plug-in directly at the four outlets mounted on a recessed panel!

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FLOODLIGHTS: Three; height adjustable to 8 1/2 feet; 360 degree horizontal arc; wide vertical arc.

ENGINE: Onan 2-cylinder, 4-cycle, air-cooled.

GENERATOR: 4-pole, self-excited, inherently regulated.

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STARTING: Electric push-button; batteries supplied.

ONAN Electric Plants are available in many sizes and models. ALTERNATING CURRENT: 350 to 35,000 watts in all standard voltages and frequencies.

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C. & E. M. Photo
A P&H crane with a Haiss clamshell digs trench for concrete drainage pipe on the Southern Equipment Co.'s grading project near Norfolk, Va.

Dual Highway Made By Adding New Lane

(Continued from preceding page)

drainage under the water main without disturbing the latter. The procedure in a typical case, where an 18-inch concrete drain met a 24-inch cast-iron water main, went something like this:

A trench, 3 feet wide x 8 feet deep, was dug across the roadway by a Haiss $\frac{1}{2}$ -yard clamshell bucket on the P&H crane. The 18-inch concrete pipe was then laid as far as the water main from each side. The trench was kept dry by a Marlow 4-inch pump powered by a Briggs & Stratton gas engine. Underneath the water main a 9-inch concrete footing was built with an 18-inch clearance between the top of the footing and the bottom of the main. This footing was shaped with a dry batch of cement, sand, and gravel. It was built up at the ends to meet the openings of the 18-inch pipe which were left about 3 feet apart. When the unwatering pump was cut off, the water rose in the trench, hardening the dry batch into concrete to complete the lower part of the manhole. The manhole was then completed around the pipe to road grade.

Concrete

The dry batches for these footings were brought to the job in a Rex 5-yard truck-mixer mounted on a Mack 5-ton truck, the property of the Southern Materials Corp. of Norfolk from which the material was purchased. The dry ingredients were mixed for 5 minutes, the time usually required for the $\frac{1}{2}$ -mile haul from the plant to the job, and then discharged on the ground. The mixed batch was shoveled into the trench and shaped into place with shovels.



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The same company supplied dry batches for the paving operation which was done in 11 and 12-foot lanes by a 27-E paver. Water was supplied by two tank trucks which were filled from fire hydrants. The paving design followed standard practice of the Virginia Department of Highways. Expansion joints were set at 90 feet, and contraction joints placed every 30 feet, with a longitudinal joint between the adjoining slabs.

Quantities and Personnel

The Southern Equipment Co. of Norfolk, formerly contracting under the name of Ames & Webb, employed a force of from 40 to 50 men under Superintendent M. M. Bateman. It completed the 2.2-mile access road early in September, 1946. The project included the following major items:

Excavation	20,825 cu. yds.
Subgrade borrow	13,399 cu. yds.
Vitrified-clay pipe, 15 to 24-inch	2,301 lin. ft.
Concrete pipe, 15 to 36-inch	1,038 lin. ft.
Drop inlets	23
Reinforced-concrete pavement, 8-inch	4,876 sq. yds.
Reinforced-concrete pavement, 9-inch	31,139 sq. yds.
Bituminous concrete	1,014 tons

For the Virginia Department of Highways, C. W. Kestner was Resident Engineer on the project, and M. S. Carter was Senior Highway Engineer. The Department is headed by General James A. Anderson, Commissioner, with C. S. Mullen, Chief Engineer, and T. F. Loughborough, Construction Engineer. This project is in Suffolk District. J. M. Hagan is District Engineer.

Roller, Grader Catalogs

Three new pieces of road equipment, two graders and a roller, are featured in literature just issued by The Galion Iron Works & Mfg. Co.

The largest and most powerful motor grader ever built by Galion, the heavy-duty Model 102, is described in Catalog 290. Catalog 288 is devoted to the Model 402 motor grader, a light unit for high-speed maintenance.

A new portable roller for all types of patch material and odd-job work, said to have the compression effectiveness of the conventional 5 to 7-ton tandems,

is described in Catalog 295.

You can secure any or all of these catalogs from The Galion Iron Works & Mfg. Co., Galion, Ohio.

Guide to Insurance Terms

Our readers have indicated their interest in our department of legal information. Similarly, perhaps, they may find useful a concise booklet on insurance terminology and phrases which are usually misunderstood or improperly used. Such a booklet is available from the Employers Mutual Liability Insurance Co. of Wisconsin, with offices at 407 Grant St., Wausau, Wis.

This Dictionary of Insurance Terms has been prepared to help the layman read and buy his insurance policy intelligently. Its definitions of words commonly used in liability insurance are clear and understandable. Copies may be secured by writing to the company and requesting the dictionary described in the December issue of CONTRACTORS AND ENGINEERS MONTHLY.

High in Work Capacity Low in Operating Cost

High work capacity, combined with low operating costs have made Chrysler Industrial Engines the first choice of many manufacturers in the field of powered industrial equipment.

Their high compression, flexible horsepower and low weight characteristics permit installation in a minimum of space. Superfinishing of moving parts brings economical operation plus maximum time on the job.

Chrysler Industrial Engines in your equipment, plus nation-wide parts availability, mean more satisfied customers and repeat business. Send the coupon today for the Industrial Engine catalog.

Some Applications of Chrysler Industrial Power

Arc Welders	Industrial Lift Trucks
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Crane Carriers	Portable Sawmills
Crane Loaders	Portable Well Drillers
Farm Tractors	Road Rollers
Fire Pumps	Self-propelled Farm Combines
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Generator Sets	Winches

This versatile machine can be easily converted to trencher, back-filler, digger or clamshell. It's powered by a Chrysler Industrial 12 engine.

Note compactness and simplicity of the Chrysler Industrial 12 engine. A top flight performer in the tough digging or lifting jobs.

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Please send the Chrysler Industrial Engine Catalog.

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Bucket Hauls Mixed Concrete to Job Site

Concrete can be transported from the mixing plant to the construction site on a Brooks Load Luger by means of a bucket just announced by the Brooks Equipment & Mfg. Co., 408-10 Davenport Road, Knoxville 8, Tenn.

The bucket is particularly applicable, the manufacturer says, for moving air-entrained concrete over considerable distances; the additives in such concrete which entrap air will prevent the settling out of the concrete in transit. It is also serviceable, says Brooks, for hauling ordinary concrete over short distances. In either case it is designed to eliminate moving the mixer to the job or transporting the concrete in a truck-mixer.

The bucket has a special tilt-type body with a converged lip designed for discharging material in constricted areas. The manufacturer points out that the concrete can be poured at any rate desired through the door by raising and



This tilt-type bucket is designed to transport concrete from the mixer to the job on a Brooks Load Luger.

lowering the handle which is provided. The truck can be moved along over a

trench and the concrete allowed to flow through this door to the depth required for the job.

This Brooks Model CB bucket can also be used for conveying gravel and similar material. It can be made in sizes ranging from 1½ to 6 cubic yards, and can be furnished promptly upon receipt of order, according to the company.

Skilsaw Adds New Line

The purchase of the Forss Pneumatic Tool Co. has been announced by Skilsaw Inc., of Chicago. As a result, Skilsaw will be able to supplement its line of portable electric tools with a line of portable pneumatic tools.

The plant, located in Aurora, Ill., has an area of approximately 40,000 square feet. Skilsaw will assume a lease on the plant and has an option to purchase the real estate. The pneumatic tools will be sold direct to distributors, along with the Skilsaw line, through the latter's sales organization.

The Forss Pneumatic Tool Co. was

founded in 1943 by F. P. Forss, who for 37 years was identified with the Independent Pneumatic Tool Co. of Chicago, and his son, John. Both will remain with the Skilsaw organization and will be in charge of pneumatic-tool manufacturing at the Aurora plant.



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THE HEIL CO.

GENERAL OFFICE, MILWAUKEE, WISCONSIN

Bituminous Macadam On Rebuilt Highway

New Location Graded and Base Stone Laid in Three Courses by Spreader; Top Penetrated and Sealed

RECONSTRUCTION of a 2½-mile stretch of highway on State Route 156 near Old Lyme, Conn., was completed during the past autumn. It brought a much needed improvement to this shore-front drive, which receives particularly heavy travel during the summer when vacationists throng to the surrounding beach area bordering Long Island Sound. A portion of the old road noted for its sharp curves has been given better alignment on a new location. But enough of the old road was rebuilt and widened on the original right-of-way to give the contractor trouble, especially during July and August, in constructing a highway and maintaining vacation traffic at the same time.

The old road had an 18-foot pavement, part bituminous and part water-bound macadam, topped by a bituminous seal coat. Shoulders averaged only 4 feet, and the narrow width plus bad alignment, both horizontal and vertical, produced a traffic hazard. The new road has a 20-foot bituminous-macadam pavement, with 8-foot shoulders in cut and 11-foot shoulders in fill, laid on a foundation course of gravel sub-base from 12 to 24 inches thick. The improvement starts at the grade-separation structure of the New Haven railroad just south of Old Lyme, and runs east in the direction of South Lyme.

The work was done between January and October of this year by Frank J. Shields, Inc., of Southbridge, Mass., after he was awarded a contract by the Connecticut State Highway Department on a low bid of \$172,469.34.

Grading

The old bituminous pavement was broken open with the scarifying teeth on a Hercules 10-ton 3-wheel roller so that it was easily removed by power shovels. Grading of the new location was carried on simultaneously with the removal of the old pavement. The excavation was handled by a pair of Northwest shovels of ¾ and 1-yard capacities. The shovels were also used at times in two borrow pits from which over 50,000 yards of additional material was taken to complete the fills. One of these pits also furnished over 10,000 yards of gravel for sub-base material. The average haul of roadway excavation was about a mile, while from the pits the haul averaged 1½ miles. Material was moved in seven trucks of varying makes and sizes, some owned and others rented by the contractor.

Fill material was spread in 12-inch layers by two tractor-dozers, an Allis-Chalmers and a Caterpillar D7. The gravel sub-base was spread in 6-inch layers by the same units, with a final shaping by a Warco grader and a Caterpillar No. 12 motor grader. The smooth-wheel roller compacted the embankment and subgrade. In fills under 4 feet the slopes are 4 to 1, and higher than 4 feet they are 2 to 1 the same as cut slopes in earth. Cut slopes in rock are 1 to 2. About 9,000 yards of rock was removed from the roadway, in one location to a depth of 19 feet. Holes were drilled with a Gardner-Denver wagon drill powered by a Gardner-Denver 315-cfm compressor. From 25 to 50 holes were shot at a time, charged with American dynamite of 60 per cent strength. A couple of Sterling 5-yard trucks hauled the rock away. An average of 1,000 yards of material, earth and rock, was moved in a 9-hour day.

Drainage

The new road is well drained, with 1,800 feet of 6-inch perforated metal underdrain, and 1,100 feet of reinforced-concrete pipe, 15 to 48-inch diameter. A great part of the latter was used for culverts. About 80 yards of concrete was required for headwalls. Forms were built of ¾-inch stock of random widths backed by 2 x 4 studs set on 16-inch centers, braced in turn by 2 x 6 single wales on 2-foot centers. The headwalls were kept dry during the pouring by first unwatering the forms with a Jaeger 4-inch pump.

Concrete was mixed on the road at the culvert sites in a Jaeger 10-S mixer. A 1 : 2 : 4 mix was used, proportioned volumetrically with 2 bags of cement, 4 cubic feet of sand, and 8 cubic feet of



C. & E. M. Photo
This Northwest ¾-yard shovel loads a Dodge 3-yard ex-Army truck during grading of a new location for part of State Route 156 near Old Lyme, Conn.

stone. Of the coarse aggregate 35 per cent was ¾-inch stone, and the remaining 65 per cent was 2-inch stone. This 2-bag batch averaged 10 gallons of water which was supplied from an 800-gallon tank mounted on a White truck. Water was obtained from the Old Lyme

reservoir. It was pumped into the tank by a Jaeger 2-inch pump carried around on the truck, and then pumped to the tank on the mixer in the same manner.

Bag cement was purchased from the Alpha Portland Cement Co. plant at

(Continued on next page)

for extra profits



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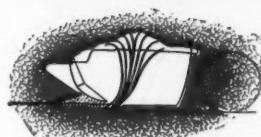


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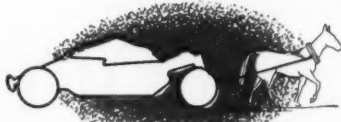
Whenever you find a scraper that consistently outperforms competitive models on job after job, it must have "something on the ball." And that certainly is the case with the new 8 and 14-yard LaPlant-Choate "Carrimors." On hundreds of tough earthmoving jobs from coast to coast these improved outfits are definitely getting bigger pay loads with less power . . . getting rid of them faster at the dump . . . and saving hours of costly "down-time" for maintenance and repairs.

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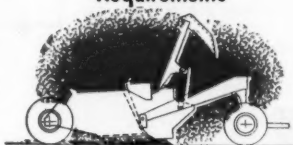
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C. & E. M. Photo
Frank J. Shields, Inc., used this Jaeger 10-S mixer to prepare concrete for culvert headwalls on his contract to rebuild 2½ miles of Connecticut road.

Bituminous Macadam On Rebuilt Highway

(Continued from preceding page)

Alsen, N. Y., and shipped to a siding of the New Haven railroad at the west end of the job near the overpass. From there it was hauled by truck to where it was needed. Sand was obtained from the Southern New England Sand & Gravel Co. which delivered it to the job after an 18-mile haul from Poquonock, Conn. All the stone used on the entire project, both for concreting and for macadam paving, was delivered in hopper-bottom cars to the same siding from the New Haven Traprock Co. 35 miles away. Here it was transferred from the cars to trucks by a conveyor, and dumped in stockpiles where the headwalls were being built. The aggregate was brought to the mixer skip by wheelbarrow, and the concrete was also discharged into wheelbarrows and then dumped into the forms.

Macadam Pavement

The stone for the macadam base course was also unloaded by the conveyor into a fleet of six trucks—four Fords each carrying 4 tons, an International 6-ton, and a Sterling 7-ton. This fleet of trucks has hauled as much as 400 tons of base-course stone in a 9-hour day on an average 1¼-mile haul from the siding to the job. The hopper-bottom freight cars carry about 60 tons each. They were unloaded with the help of two men in the car shoveling the stone to the hopper, while a third man operated the conveyor. The trucks unloaded into the hopper of an Adnun Black Top Paver and the stone was spread in two 10½-foot lanes to make a base course 21 feet wide. By controlling the flow of stone from the box, a layer of any thickness was possible, commensurate, of course, with the size of the stone.

An initial layer of 2-inch stone was laid on the gravel sub-base to a loose depth of 4 inches. It was then compacted to 3 inches by a pair of 10-ton 3-wheel rollers—the Hercules and an Austin. Voids in the stone were then filled with sand which was laid on top of the stone by a Buckeye spreader attached to the back of a sand truck, and pushed along on four rubber-tire wheels. This sand was obtained from a roadside bank near the center of the job where one of the shovels loaded the trucks. Enough sand was spread to choke all the voids in the base stone. To insure its working well down to the bottom of the layer, the sand was kept wet to the consistency of grout in front of the rollers which compacted stone and sand together in a waterbound course. Water was sprayed by gravity from the 800-gallon tank truck through a 10-foot spray bar which had a double row of ¼-inch holes on 1-inch centers to assure an even wetting. The operations of sanding, wetting, and rolling

continued until a solid, firmly bonded course was obtained.

The gradation of the base stone and the sand used for the choke is as follows:

Sieve Size	Per Cent Passing	
	Stone	Sand
2½-inch	100	.....
2-inch	90-100	.....
1½-inch	30-55	.....
1¼-inch	0-15	.....
1-inch	1-5	.....
¾-inch	.....	100
No. 4	.....	95-100
No. 50	.....	10-25
No. 100	.....	0-5

After this course had dried out, the exact operation was repeated with the laying of another 3-inch compacted base course on top of the first one, using similar materials, to form a total 6-inch compacted waterbound base. When this upper layer was dry, all surplus and loose sand was swept from the surface by a Hough rotary power broom until the stone showed clean on top. Then a top course of the same-size stone was spread by the Adnun to a loose depth of 3 inches and compacted

by the rollers to 2½ inches. This top course was carefully checked for any irregularities. If any high or low spots were discovered, men with forks shifted the stone about, after which the surface was rolled again. No choking with sand was done to this upper course. A center crown of ¼ inch to the foot was maintained. For 100 feet of 21-foot pavement, 33 tons of this coarse stone was required, plus 11 tons of sand filler.

Bituminous Work

Asphalt with an 85 to 100 penetration and heated to 350 degrees F was then applied to the top stone at the rate of 2 gallons per square yard. The bituminous work was done by the Mystic Bituminous Co. of Boston, Mass., which hauled the asphalt from its plant at Portland, Conn., 33 miles to the job site. The bitumen was applied by an Etnyre

(Continued on next page)

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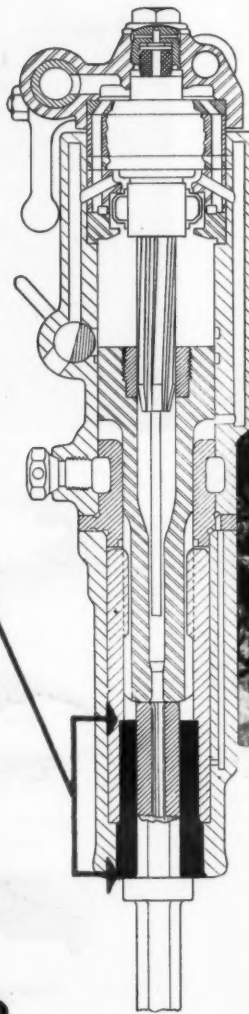
To maintain efficiency and protect against excessive steel breakage or damage to the piston hammer, the chuck, while extremely rugged, still must be replaced regularly.

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C. & E. M. Photo

To avoid "fat" spots while bitumen was applied to the top stone course by this Stayne distributor, the Mystic Bituminous Co. built a box to catch the initial shot until the White truck got moving.

Bituminous Macadam On Rebuilt Highway

(Continued from preceding page)

1,279-gallon distributor, mounted on a White truck, which was kept filled by a feeder tank on a Mack truck. The feeder carried 2,900 gallons in its 3,200-gallon tank, which was not filled to capacity because of the high temperature to which the material was heated. At the plant the asphalt was loaded into the distributor or feeder trucks at from 250 to 275 degrees F. This temperature was later increased by the burner on the distributor before the material was applied to the stone.

In preparation for the bitumen, workers with shovels threw up a little earth berm alongside the stone base. This was designed to prevent the asphalt from trickling off on the shoulders and to give the road a neat edge. To avoid "fat" spots of excess bitumen being applied at the start of each run of the distributor, a box was placed on the stone to catch the initial shot until the truck got rolling. Made of wood, this box was 11 feet long x 3 feet wide and 4 inches deep. It was lined with a layer of Sisalkraft paper which was discarded after each usage. The box was easily moved about by handles which hooked into the sides.

The initial lane was penetrated with a 9-foot spray bar so that the trucks had room to pass on the adjoining side of the road. The bitumen was covered at once with $\frac{3}{4}$ -inch stone applied at the rate of 54 pounds to the square yard. This cover stone had been previously spotted along the shoulders in stockpiles from where it was cast over the asphalt with shovels by a group of workers. The cover was applied by hand on the theory that the stone dust blows away in the air and permits the stone to adhere at once to the asphalt; if a spreader box were used, the dust would tend to make the first contact on the bitumen and thus prevent the stone

upper layer of coarse stone. This was followed by a broom drag which turned over the light stone on top, coating it with bitumen on all sides. The drag consisted of a 9 x 12-foot wooden frame on which two transverse rows and one diagonal row of 6-inch steel-bristle brooms were attached. It was pulled by a Dodge truck, formerly an Army weapons carrier and now used as a service truck. The rollers followed up the brooming and smoothed the surface. The adjoining lane was penetrated in the same manner, but this time with an 11-foot spray bar to complete the full 20-foot width of pavement. The extra foot of base stone, 6 inches on each side, will serve to prevent the pavement from raveling at the edges. After the second lane was covered with stone, then rolled, broomed, and rolled some more, the final seal coat was applied.

To prevent traffic from throwing dirt into the penetration course, the seal coat followed at once. The same-penetration asphalt, 85 to 100, was applied in two 10-foot lanes at the rate of

$\frac{3}{4}$ gallon per square yard. It was covered with $\frac{1}{2}$ -inch stone, 26 pounds to the square yard, also cast on by hand from stockpiles spotted along the shoulders. The general procedure was to apply penetration as far as three distributor loads would go, or about 600 feet full width, and then seal this up with a single load of the distributor. The top cover stone was rolled and broom-dragged, and then given a final rolling while the edges of the pavement were trimmed to neat lines with square-edged shovels. The gradation of the two kinds of cover stone is as follows:

Sieve Size	Per Cent Passing	
	$\frac{3}{4}$ -Inch Stone	$\frac{1}{2}$ -Inch Stone
1-inch	100	.....
$\frac{3}{4}$ -inch	90-100	.....
$\frac{1}{2}$ -inch	10-40	100
$\frac{3}{8}$ -inch	.....	30-60
No. 4	0-20	0-15
No. 8	0-5	0-5

The final touch to the new road was the building of 8-foot shoulders with two 4-inch courses of gravel, graded

(Concluded on next page, Col. 2)

from bonding as it should.

The rollers then passed over the stone cover, working it well down into the asphalt and filling all the voids in the

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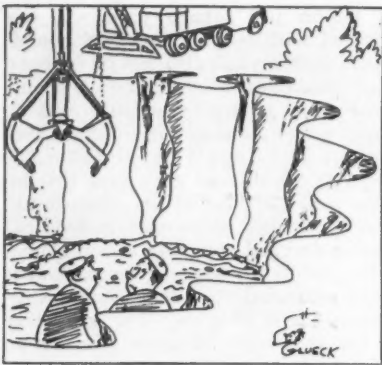
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The latter has a needle-roller construction with a full complement of small-diameter rollers. By increasing race and roller contact, load-carrying capacity is raised to the maximum, the manufacturer says. The flange which retains the rollers at the front of the assembly is built integral with the stud, and the pressed-on washer in the rear is prevented from coming loose by the part against which it is fastened.

One of the features of the ball and roller bearings is that the bronze retainer is supported or piloted on the ground and polished lands of the inner ring. Thus the friction between balls and retainers is said to be greatly reduced, which in turn reduces ball wear. The race contour corresponds, as nearly as is consistent with good design, with the ball contour. This is said to result in larger areas of contact and greater load-carrying capacity. The bearing dimensions are to SAE and U. S. Navy Department standards.

A large catalog is available which describes all the bearings in the line and applications for them. There are numerous tables listing capacities, dimensional tolerances, safety factors, shaft and housing fits, lubrication data, etc. This catalog is available for the asking. Write the company and request the bulletin described in CONTRACTORS AND ENGINEERS MONTHLY.

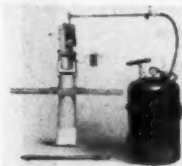
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Bituminous Macadam On Rebuilt Highway

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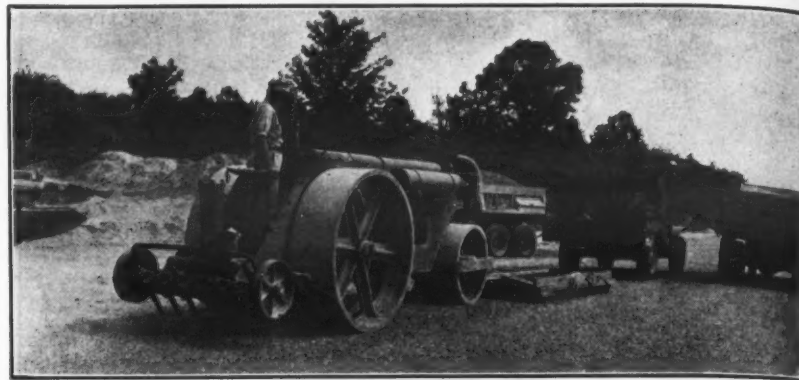
from 1½-inch down to fines. Each layer was wet down for better compaction. When the moisture was gone the surface was treated with RT-3 tar, ¾ gallon to the square yard, divided into two applications.

Quantities and Personnel

The major items listed in the contract include:

Earth excavation	49,867 cu. yds.
Rock excavation	9,040 cu. yds.
Borrow	50,761 cu. yds.
Gravel sub-base	10,100 cu. yds.
Cover stone	4,875 tons
Base stone	12,038 tons
Tar for shoulders	28,850 gals.
Asphalt for pavement	77,847 gals.
Sand filler	32,500 sq. yds.

A force of 35 was employed by Frank J. Shields, Inc., under the direction of Andrew Natale, Superintendent, assisted by Stephen Natale in the field and John F. Driscoll in the office. For the Connecticut State Highway Department,



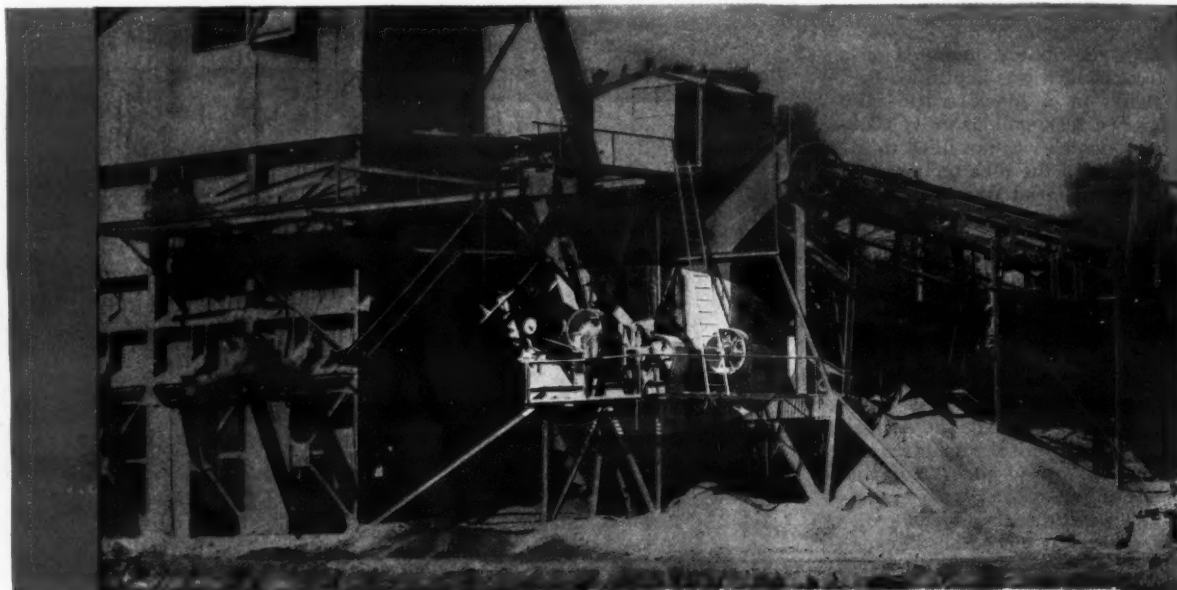
C. & E. M. Photo

A Dodge truck, formerly an Army weapons carrier, pulls a broom drag over ¾-inch cover stone which has been rolled into the penetration course. A Hercules 10-ton roller follows up on the Frank J. Shields contract.

ment, Frank Ginnetti was Inspector, assisted by James Shugrue and John Sullivan. The job is located in the residency of L. H. Beebe, Resident Engineer. The Department is headed by William J. Cox, Commissioner, with Arthur W. Bushell, Deputy Commis-

sioner and Chief Engineer. Leslie G. Sumner is Director of Engineering and Construction.

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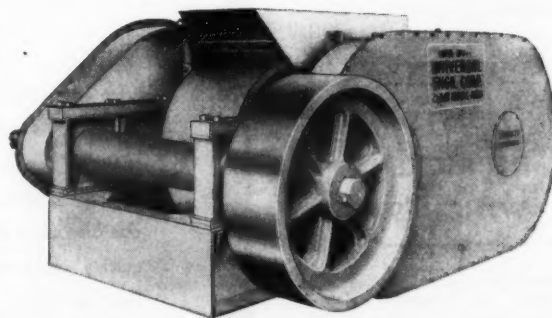
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Cast-Iron Sewer Pipe Is Floated Into Place

Unusual Methods Employed To Lay 500 Feet of Pipe Weighing 233,296 Pounds On City Project

A 500-FOOT section of 36-inch cast-iron sanitary-sewer pipe weighing 116½ tons was floated out and sunk into place in the Trout River, Florida, this summer. On the job, the City of Jacksonville adopted unusual methods to combat increased labor and material costs. Part of a sanitary-sewer extension involving more than ½ mile of cast-iron and concrete pipe, the work was completed at a cost of about \$40,000. The decided reduction in price as measured by low bid is directly traceable to the unorthodox methods employed by W. C. Daniel, Superintendent of Sewers, in placing the heavy discharge pipe in the river.

It has been a hard and fast policy of the City Commission and W. E. Sheddan, Jacksonville City Engineer, to advertise for open, competitive bids on all city construction projects. But when bids were opened this spring on the sanitary-sewer-extension job, which involved 500 feet of 36-inch cast-iron pipe, 165 feet of 36-inch concrete pipe, and 2,505 feet of 30-inch concrete pipe, the low figure of \$59,000 was so far beyond estimates that bids were rejected. City Engineer Sheddan conferred with Sewer Superintendent Daniel and Assistant City Engineer Walter G. Daniel. It was decided that equipment would be rented and the necessary sewer extension would be constructed on a straight time and material basis by the City Engineer's Office.

The extension is located near the northeastern edge of Jacksonville from the Trout River, where the discharge pipe runs 500 feet out into the river, down Tamarack Street to Lawton Street, and on Lawton from Tamarack to Main Street.

Ditching

On April 19, the City Sewer Superintendent, who was placed in charge of construction, started work on 2,770 feet of ditches. His crew included 23 laborers, 2 foremen, 1 material man, and 2 truck drivers. Working a 10-hour shift 5 days a week, this force completed the project in less than two months.

The City rented a P&H ¾-yard dragline with a 35-foot boom. This not only handled all ditch excavation, but doubled as a crane to lower cast-iron and concrete pipe into place in the ditches. Ditches, which varied in depth from 8 to 13 feet, had 5-foot bottoms with side walls of almost 1 to 1. The P&H dragline averaged 300 cubic yards of excavation per 10-hour shift. Ditches were shored with 2 x 8's and braced with 4 x 6's.

Wellpoints

The bottom cut of the sewer ditches was below sea level, and a Griffin wellpoint system was used to keep them

dry until the pipe was laid. Approximately 500 linear feet of wellpoints were used. They were set 10 feet off the center of the ditch and were driven on 6-foot centers to an average depth of 4 feet below the cut. A 16-foot stand-pipe was used and an 8-inch Griffin pump pulled the wellpoints, keeping the below-sea-level ditches bone dry.

Cast Iron Pipe

This particular section of sanitary sewer discharges from the end of concrete pipe through 500 feet of 36-inch cast-iron pipe into the Trout River. A ditch extending for 500 feet up from the bank of the river was excavated and bulkheaded at the river end. The P&H dragline, with a steel hook attached at the end of the cable, swung sections of



With shoring in place, the 500-foot ditch in which cast-iron sewer pipe will be joined is unwatered by a Griffin wellpoint system. A Griffin 8-inch pump is shown here pulling the points.

the cast-iron pipe into place in the ditch. Then the pipe in 12-foot lengths was fitted and caulked until the entire

(Continued on next page)

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- TS . . . A medium weight bucket, classified as a general purpose bucket.
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You automatically step up the YARDAGE of your dragline by hooking up a Hendrix Lightweight Bucket! It's 20% to 40% lighter than other buckets, type for type. Can be used on a machine designed for small operations and still maintain the allowable loaded weight. You'll get bigger payloads on operations requiring a long boom, and in wet digging you'll increase your payloads by leaving the water in the pit. We took the load out of the bucket... to let you put it inside!

- ★ 20% to 40% lighter than other buckets, type for type.
- ★ All welded construction for greater strength and durability.
- ★ Manganese Steel chains, fittings, and reversible tooth points.
- ★ Full Pay Load every trip, even in wet diggings.
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Here the entire 500 feet of 36-inch cast-iron sewer pipe is in place in the ditch, ready to be floated out into the Trout River in Jacksonville, Fla.

Cast-Iron Sewer Pipe Is Floated Into Place

(Continued from preceding page)

500 feet stretched along the floor of the ditch. After caulking, steel bulkheads were placed at each end of the 500-foot section of pipe and the entire length was tested for leaks with an Ingersoll-Rand 105-cfm compressor.

The bulkheads at each end of the length of pipe consisted of 3-inch steel plates with 2½-inch angle irons. Two 4-inch holes were drilled in each bulkhead plate and lengths of hose were welded into the holes and capped. The steel-plate bulkheads were bolted into place and sealed with asphalt.

Floating Pipe in Place

While the cast-iron pipe was being joined in the ditch, a barge with a P&H crane had been driving 32-foot piles on 12-foot centers in the river. Between the piles, graded cross bents on which the pipe would rest had been built at a depth of 10 feet below water level at the outer end and at a depth of 6 feet below water at the shore.

When Superintendent Daniel was ready to float the pipe out into place in the river, the dirt bulkhead at the river end of the sewer ditch was removed. As the river water poured in, the 500-foot

section of airtight pipe floated in the ditch.

A truck with a winch was parked at the shore end of the ditch. A length of ½-inch preformed wire rope was unreeled the full 500 feet of the pipe and attached to the end farthest from the truck. As the winch reeled in the steel cable, the entire section of cast-iron pipe, weighing 5,600 pounds per 12-foot joint, was pushed rather than pulled into place between the piles and above the bents in the river.

When the 500-foot pipe was in place in the river, the caps were removed from the hose in the 4-inch bulkhead holes and the bolts were removed from the bulkheads. A steel cable was inserted through the lower hose, run inside the bulkhead and out the upper hose. As the lower hose was uncapped, river water rapidly filled the pipe and the section sank into place on the bents. The uncapped upper hose allowed air to escape from the pipe as it filled with water.

Removal of the bolts from the bulk-



The 500-foot length of pipe is now floating between the piles and above the graded cross bents on which it is to rest. At the far end, workers are preparing to uncage the hose in the bulkhead plates to allow the river water to fill and sink the pipe.

head plates left them held in place by the asphalt seal. The plates were removed later by attaching the steel cable which had been passed through the hose to a tug and simply pulling them away. The shore end of the cast-iron discharge pipe was later connected to a manhole.

Concrete Pipe

After the cast-iron pipe had been sunk into place, the dirt bulkhead was replaced at the shore edge of the ditch and the ditch was unwatered with the Griffin wellpoint system. The P&H dragline again doubled as a crane, swinging

(Concluded on next page, Col. 2)

Always Your Best Bet

for Dirt Moving

INTERNATIONAL Diesel Crawlers

WHERE real dirt-moving records are being made, there's a Diesel crawler tractor doing the heavy work. If it isn't doing the whole job of powering the digging, carrying and spreading, it pushes other rigs through the loading zone to get capacity loads rolling quickly.

Whether hauls are long or short, Diesel Crawlers are in there to make the job move along on schedule. Without them, many a vaunted record would not have materialized.

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Yes, your best bet is International Diesel Crawlers for all earth-moving power. Advanced engineering gives them long life, smooth performance, unit construction for easy and time-saving service and a positive instant starting system. Their rugged build assures true alignment of all moving parts and an unusual ability to absorb punishment. Their full-Diesel engines assure matchless operating economy.



The excellent balance and maneuverability of International Crawlers give them sure-footed safety and quick response to all performance demands.

Call on the International Industrial Power Distributor near you for facts and figures on International Diesel Tractors, Power Units and matched equipment. He'll be a valuable friend to have when competitive days require closer study of costs and performance.

Industrial Power Division

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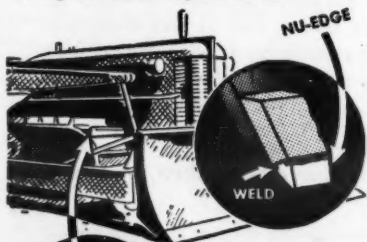
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The Bulldozer Blade Nu-Edge Bar is butt-welded to new or worn blade and welding bead covered with a thin layer of hard-surfacing electrode—Affording 2000% savings in blade replacements.

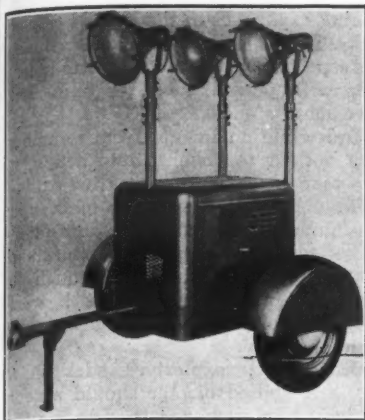


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are easily welded to any size grouser shoe without dismantling assembly. Made of special work-hardening steel which becomes tougher with use—outwearing original grouser.

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This Revere portable gas-engine-driven generator can be rigged for floodlights or used to power small tools.

Power-Light Plant, Gas-Engine Driven

A portable power unit for producing electricity on the job is being offered by the Revere Electric Mfg. Co. of Chicago. The unit is equipped with floodlights for nighttime illumination and also has receptacles for plugging in power tools.

Balanced on two wheels with a yoke for hauling behind a truck, the Revere power unit has an air-cooled engine, operated by control-board push buttons. The generator is of the 4-pole self-excited type, producing alternating current. Starting batteries are charged by a separate dc generator. Toggle switches on the panel control the three floodlights, which can be accommodated with a total capacity of 3,000 watts.

You can secure all details about this light-power plant by writing the Revere Electric Mfg. Co., 6009 Broadway, Chicago 40, Ill., and mentioning this report in CONTRACTORS AND ENGINEERS MONTHLY.

AED Autumn Meetings

With the removal of all OPA controls on November 10, construction machinery distributors look for a cessation of other emergency Governmental controls on the industry early next year. Their belief was reflected in a series of regional conferences of Associated Equipment Distributors in California, Washington, and Colorado, as well as at the recently concluded autumn meeting of that body's Executive Committee.

Assembling in the Sonoma Mission Inn at Boyes Springs, Calif., on Oct. 6, 7, and 8, the Committee set Feb. 13-16, 1947, as the date for the Association's 28th Annual Meeting, at the Edgewater Beach Hotel, Chicago.

Region 11 of the AED, embracing Arizona, California, Nevada, and Hawaii, held its annual conference also at Boyes Springs, Oct. 9, 10, and 11. It was presided over by A. F. Garlinghouse, Vice President of AED and Director of Region 11, of Los Angeles, Calif.

Region 12 held its fall conference at Seattle, Wash., at the Olympic Hotel, on Oct. 15 and 16, with Fred M. Viles, of Spokane, Regional Director, presiding.

Region 14, comprising Utah, Wyoming, Colorado, and New Mexico, met at the Cosmopolitan Hotel, Denver, Colo., on Oct. 18 and 19, with W. A. Norris, of Cheyenne, Wyo., presiding, and national officers Bucher, Winchester, and Moyer attending.

AED regional conferences in November included: Region 13, western Tennessee, Arkansas, Mississippi, and Louisiana; Region 10, Texas and Oklahoma; Region 9, Iowa, Nebraska, Kansas, and Missouri; Region 8, Minnesota, North and South Dakota; Region 7, Wisconsin, Michigan, Illinois, and Indiana; and Region 2, New York and New Jersey.

National AED officers implemented the programs of these regional meetings with reports on and discussions of national legislative and Governmental aspects of industry problems.

Cast-Iron Sewer Pipe Is Floated Into Place

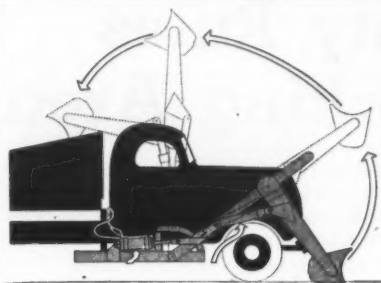
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into place 165 feet of 36-inch concrete pipe and 2,505 feet of 30-inch concrete pipe. The ditches were filled by a Caterpillar D8 with bulldozer which also compacted the fill by passing over it with its treads.

Concrete pipe used on the project was purchased from the Sherman Concrete Pipe Co. of Jacksonville and was hauled 10 miles to the job site. Cast-iron pipe was purchased secondhand and was hauled 6 miles to the project.

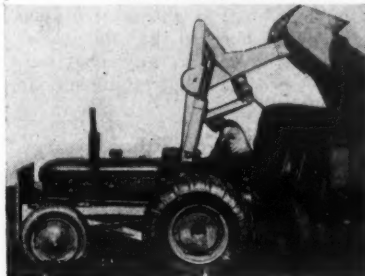
Personnel

In charge of construction for the Jacksonville City Engineer's Office was W. C. Daniel, Superintendent of Sewers. The Jacksonville City Engineer is W. E. Sheddan and Walter G. Daniel is Assistant City Engineer. Thomas C. Imeson is Commissioner in charge of the Sewer Department.



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-- at Low Cost for
every yard need

● Profitable, uninterrupted yard operation in cold weather calls for steam—hot water or heat—for many purposes.

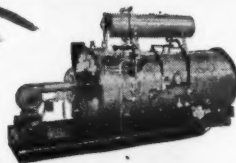
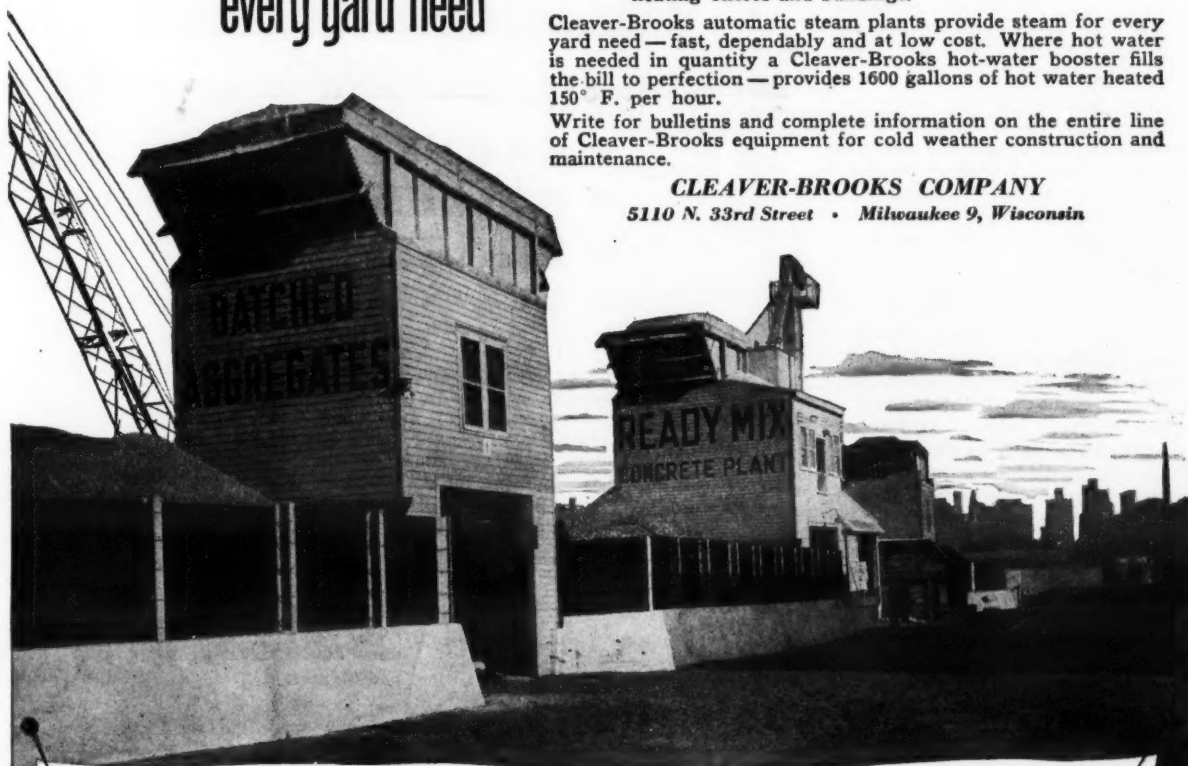
- thawing and heating aggregate in stock piles or bins—for winter concreting.
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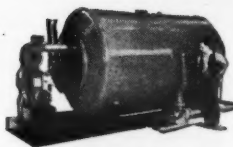
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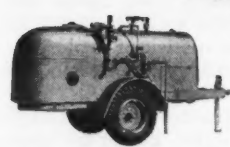
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Oil-fired; fully automatic or manual operation; no licensed engineer needed; two capacity sizes: 3000 gals. storage tank for 1600 gals. of water heated 150° F. per hour; 1500 gals. storage tank for 800 gals. of water heated 150° F. per hour.



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Heats bituminous material by direct firing in one operation, loading directly to distributor, relay truck or returning to tank car. Two sizes, truck mounting or 4-wheel trailer.



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Available in 2 and 3 tank-car sizes. Oil-fired with exclusive four-pass flue travel; dry-coil steam condensate return under pressure—no water or heat loss. Provides a portable source of steam wherever needed.

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Pioneers and Originators of *TANK CAR HEATERS *BITUMINOUS BOOSTERS *AUTOMATIC STEAM-PLANTS

Blasting-Safety Rules In the Working Area

Crew Organization Plus Common-Sense Procedure Means Safety in Charging, Tamping, Stemming, Firing

† SAFETY in blasting, as we emphasized in a recent article, stems from healthy respect for the power that is in explosives, and from strict adherence to common-sense rules. In that article, we covered general rules for the handling and storage of explosives, and the preparation of the charge.

When the blasting charge is brought to the working area, new safety problems face the contractor. Many of the most disastrous blasting accidents occur in the loading area, be it the tunnel or quarry face, the rock cut, or the fill-settlement project.

The Blasting Crew

A well organized crew, which can carry out systematized operations on the basis of a division of labor, is the only kind to assign to blasting. Not only will it promote safety; it will also provide for better production and, consequently, added income for the contractor.

Every man in a blasting crew should have specific duties assigned him. Just as too many cooks spoil the iceman, too many hands cause disaster in blasting. Only the minimum of personnel needed to do the job properly should be allowed into the blast area, and no one should undertake to perform tasks haphazardly.

On a tunnel job, it is best to carry explosives to the face in one car and detonators in another, making every effort to keep the caps, fuses, and other detonating accessories away from the rest of the charge. Separate trips are the best means to this end. But should it be necessary for crew members to carry the explosives, one man should take the charge, and another the detonators. They should use special containers for this, and keep the two blasting elements as far apart as possible to forestall a premature explosion.

Similar precautions must be taken in outdoor blasting, with extra-special care against sparks from shovels, locomotives, exhausts, and other hazards. Detonating wires must be kept clear of all possible sources of electric current, wires, tools, rails, and stray electricity.

Charging the Bores

During charging operations, the full load of explosives should be kept some distance from the face and the cartridges brought forward in small quantities, to minimize the danger of a big blast in case of an accident near the drilled hole. Explosives should be removed from their containers only as they are being used, never left lying around on the ground. For it is much too easy for a stick of explosive to lose itself in muck or rubble, and to find itself again with a bang.

Many a disaster occurs when the bore hole is too tight. Either the loader tries

forcing the explosive into the hole with a little too much vigor—a practice that invites an early halo-fitting session—or the load cannot be placed at the bottom of the hole and poor firing results. Drill runners must therefore be cautioned: (1) never allow your bits to wear to such an extent that bore holes are too tight for the charge to be used; (2) keep a log of every bore so that the loader may have a guide to any chamber, cavity, or loose rock that might impede the loading.

Use of Force Taboo

Your blast man may be a real crusher with the ladies, but when he's loading explosives in bore holes, he should never exercise his muscular prowess. In gentleness there is strength, and a



chance to collect social security some day.

Impact, grinding friction, sparks, and flame are the greatest enemies when

placing explosives in the bore. Friction makes sparks, and sparks make trouble; it is especially dangerous in gritty holes, ones with jagged bores, or ones that have loose stone.

And while an impact from ramming may not jar the charge into action, it may tear the cartridge, smearing explosive along the bore where contact with the tamping stick may explode it later.

Grit, too, is a deadly factor in blasting. No cleaning can be too thorough to keep grit on the tamping stick from rubbing against other grit on the wall or in the bore.

Occasionally explosives stick in a hole. A skilled blaster should render treatment in such a case. As a rule, he must split the cartridge from top to bottom with a long, pointed tamper, being sure the stick is free of gritty particles.

Where blasting powder is used as the charge, and it is poured loose into the bore hole, some always manages to spill around the mouth, while more clings

(Continued on next page)



**America's Most Complete Line
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All purpose—

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Clamshell
Sizes 3/8, 1/2, 3/4, 1, 1 1/2, 2 yds.



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Dragline
All purpose sizes 3/8 to 2 1/2 yds.
Heavy duty sizes 2 to 3 1/2 yds.
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Sizes 3/8 to 18 yds.



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Blasting-Safety Rules In the Working Area

(Continued from preceding page)

along the sides of the bore. Sweep the excess into the hole, and be wary when tamping not to explode particles that linger along the bore walls. If blockades down in the hole prevent the powder charge from settling to the bottom, careful probing with the tamping stick will be of help.

Experience has shown that it is good practice with most explosives to drop the cartridges into the bore hole providing the hole is free. If the hole is ragged, cartridges may tend to stick in the hole and under such circumstances it is usually best to lower them.

Sprung Holes

In some types of quarrying, sprung holes are necessary. Such work should be handled by men experienced in it. The important safety factor to keep in mind is that the rock, down deep, where the sprung hole is, doesn't cool off very fast. Give the rock plenty of time to cool before placing subsequent springing charges in the same hole, and stand clear when dropping the shot into the hole. Headless horsemen are popular in story books, but they don't help in contracting.

Other dangers in springing: rock heated from one sprung hole may detonate another hole, though it is at some distance; or the springing of one hole may explode another loaded hole. So keep a goodly distance between the holes that are being sprung.

Tamping

Tamping explosives is a task that demands the utmost caution. But no blaster has ever been hurt by being gentle and carrying a big stick. Make sure it's a stick, for metals on tamping rods make them too heavy and invite sparks.

During the tamping, fuses and wires should be held taut along one side of the hole to avoid injuring them. Never use a ramming action, only a steady, gentle pressure, and keep your rod clean at all times, free of grit.

The Institute of Makers of Explosives says, "There is real protection in selecting the right explosive and loading it in a manner that requires very little use of the tamping block. In fact, the best modern practice avoids the use of the tamping block in well drill holes for compacting either the explosive or the stemming."

Stemming

Stemming is used in blasting to hold the charge in place, to prevent sparks from near-by fuses entering and exploding the hole prematurely, and to give greater compression of gas, thus producing a better explosion.

The quality of the stemming material used is important, for sharp particles

may abrade the fuse or detonator and lead to misfires. Use fine materials, but make sure they have sufficient cohesion and weight to resist being thrown from the mouth by the blasting. Avoid inflammable materials, especially in tunnels.

Tamping bags tend to save time and give better results. They can be filled away from the face using uniform material. This saves time and labor in stemming the bore hole, and reduces the danger of injuring the fusing or wires, and of explosions from abrasion.

When the primer is at the outer end of the charge, use only a very light tamping pressure on the first few inches of the stemming.

Firing

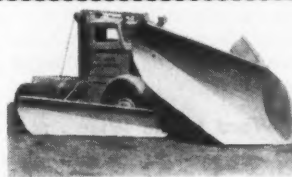
Before the blast is to be set off, the firing man should see that all workmen in the area clear out. A general alarm serves this purpose, but is occasionally overlooked or unheard by some men. Remember that the results of the blast may extend farther than you expect,

and take every precaution to protect passers-by, livestock, and the like.

Firing with a cap and fuse requires a fuse long enough to allow the blaster to reach safety. Be sure the fuse is lit, that it is long enough to allow you to reach shelter; then "light out" yourself. But walk—don't run! And for the love of Pete, don't be in a hurry to rush back and find out why a shot hasn't fired yet. It still might!

Electric firing demands that the wiring be in good condition, that all connections are properly made, and that the firing apparatus is in working order. Two single leading wires are good insurance against misfires. Never use short lead cables. Electric firing mechanisms should be kept away from stray electricity, and should be short-circuited until ready for use. Test them

(Concluded on next page)



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enjoy engineer-preference throughout the snow belt. They have won their spurs through Faster • Safer • Cleaner Snow Removal.

ACT PROMPTLY

We'll be glad to give you complete information—the sooner the better, because, frankly, there'll be a waiting list. The early bird will get the Sno-Plow—and repair parts—unless steel starts coming through at a much faster pace.

ALL SIZES and TYPES for
TRUCKS • TRACTORS • MOTOR PATROLS

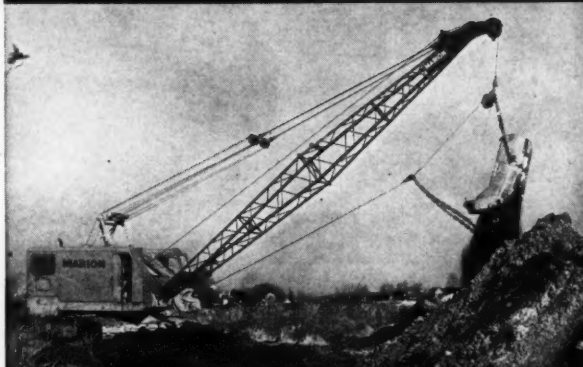
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Offices and Warehouses in all Principal Cities



Blasting-Safety Rules In the Working Area

(Continued from preceding page)

at certain intervals to make certain they are in shape and capable of delivering enough current to fire the entire circuit.

High-tension lines create a hazard on many blasting operations these days, for lead wires have a way of being tossed onto them by the blast. Then, too, there is the possibility that the power lines may set up an induced current in the blasting cable, fouling up the entire firing procedure.

All outdoor blasting activities as well as electric firing in tunnels and shafts should be suspended on the approach of a thunder storm, for lightning frequently strikes explosives or wiring with disastrous results. When the storm approaches, all but one or two men should leave the work. These should short-circuit all detonating wires in primed holes, cover all loaded holes, and return supplies of explosives and detonators to their magazines. Remember, the time to prevent lightning accidents is when the first threat of storm is observed. Often there is more aerial electricity before the storm than during it!

Clean-Up—Misfires

It isn't easy to set a time limit for returning to the face after a shot has been fired. Underground there is always the danger of poisonous fumes, smoke that blinds one to hazards, and loose roofing. And of course, indoors and out, there is always the possibility of delayed shots, misfires, and displaced explosives underfoot.

Many accidents that might easily be prevented result during secondary blasting to break up large rock. Indiscriminate firing while other men are working in the vicinity often causes the trouble. In this type of blasting, block-holing is generally considered more desirable than mud-capping, for it tends to prevent a scattering of the explosive. Dynamite is usually preferred to blasting powder for this work.

Where misfires are concerned, the best antidote—and the only real one—is to select the safest explosive for the job, store it properly, use it before it deteriorates, and follow the correct techniques for priming, loading, tamping, and firing. For it is always easier

to prevent misfires than it is to handle them. The best advice we can give the man who must handle them is "Be careful".

The methods for treating various types of misfires are many, and vary with the task and the individual. In general, though, never entrust this work to a novice; always be wary of explosives that may be scattered among the broken rock underfoot; probe to loosen stemming in unfired holes only with extreme care; avoid sparks, and keep the hole wet. Since blowing out the holes may have disadvantages, washing the explosive out is today considered the safest practice.

A Word to the Wise . . .

As anyone concerned with blasting will recognize, it is virtually impossible to go into a very detailed account of the safe techniques in handling explosives. Only the best, meaning the safest, can be listed. But once they are understood, there will at least be no more false economy in blasting procedures—



no trying to curtail expenses by the use of deteriorated material and short fusing, no cutting corners on time and effort.

All the expense, time, and effort which can conceivably be spent to pre-

vent blasting disaster is as nothing compared to that spent trying—often in vain—to rectify it.

We'll be glad to supply you with further information on how you can adopt safe blasting practices. Write to the Editorial Department, CONTRACTORS AND ENGINEERS MONTHLY, at 470 Fourth Ave., New York City 16, N. Y.

Mobile Power Saw

Highway-maintenance engineers and contractors may be interested in a broadside recently issued on the new Lowther C-saw, a mobile one-man power saw. As described, the saw will fell timber, buck logs, cut limbs, clear land, and cut ice. It is about the size of a wheelbarrow, is balanced on wheels, and cuts at almost any angle as well as at ground level.

Copies of the descriptive bulletin and further details about the C-saw can be obtained by addressing the Harry A. Lowther Co., 141 W. Jackson Blvd., Chicago 4, Ill.



CONTRACTORS—
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In short it is Series 71 General Motors Diesel power.

GM Diesels are 2-cycle. That makes them compact as well as powerful. They have clean design, unit injectors and Uniflow

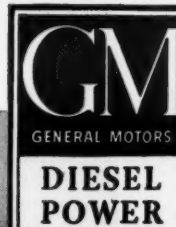
scavenging—making them clean-burning, efficient and easy to take care of.

These features make GM Diesels important to any industry.

So whatever needs for power you may have in road-making machinery, crushers, shovels or any other construction equipment—look to GM Diesels.

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DETROIT 23, MICH. • SINGLE ENGINES . . . Up to 200 H.P.
MULTIPLE UNITS . . . Up to 800 H.P.
GENERAL MOTORS



Features of GM Diesels Important to Every User of Power

QUICK TO START—on their own fuel

ECONOMICAL—run on low cost fuel

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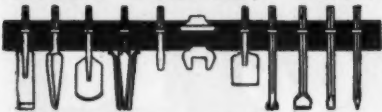
LESS FIRE HAZARD—no volatile explosive fuel

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SMOOTH OPERATION—rotating and reciprocating forces completely balanced

QUICK ACCELERATION—2-cycle principle produces power with every downward piston stroke

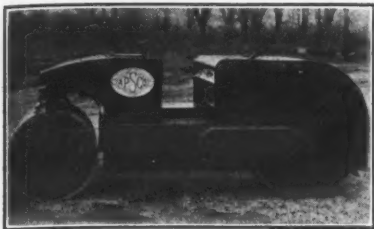
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We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

BICKNELL MANUFACTURING CO.
12 LIME STREET ROCKLAND, MAINE



The Apsco 3 to 4-ton tandem roller pictured here features air steering and air clutches forward and reverse. It is gear-driven throughout.

New Roller Features Air Steering Control

A 3 to 4-ton variable-weight gear-driven tandem roller has recently been announced by The All-Purpose Spreader Co. The Apsco roller features air steering and air clutches forward and reverse. No chains or belts are used in the drive; it is gear-driven throughout, mounted on Timken bearings. This feature is said to prevent looseness, slack, or lost motion and is especially desirable when starting on hot bituminous or water-bound macadam roads.

For power, it uses a Continental Model N-62 or Hercules Model ZXB 4-cylinder engine, with a 2 $\frac{5}{8}$ -inch bore x 3-inch stroke and 64.9-cubic-inch piston displacement; the engine develops 16.1 hp at 1,800 rpm. The transmission has two speeds, forward or reverse. Control is by twin 6-inch heavy-duty Fawcok Airflex clutches. Drive is from the pinion on the end of the transmission, to an idle gear, to a gear on the countershaft, to a bull-gear pinion, on to the final-drive bull gear which is attached to the rear compression roll. Speeds vary from 0.5 to 5 mph.

Steering is by an air pump and two cylinders. The air cylinders are attached to the main frame, and the piston rods are connected to the king pin by steering arms. The king pin is carried on Timken roller bearings in the front of the frame. The swivel pin operates on bronze bushing bearings. Air is furnished by a 7-cubic-foot twin-cylinder air compressor with an ample air-storage tank attached. The brake is the internal-expanding type with the brake drum attached to the pinion.

Rolling width and diameter of the Apsco front roll is 32 inches. The rear roll has a diameter of 42 inches and is 36 inches wide. The rolls are watertight, and provision has been made for filling to give added weight. The front roll gives a compression of 75 pounds per inch of roll face and 94 pounds with water ballast. The rear roll gives 100 pounds per inch of roll face and with water ballast, 140 pounds.

Other dimensions are: wheel base, 96 inches; ground clearance, 11 inches; turning radius, 35 degrees; and weight 6,000 pounds or 8,000 with water ballast. Further information can be obtained from the company at P. O. Box 105, Fuller Road, Elyria, Ohio, upon mention of this notice in CONTRACTORS AND ENGINEERS MONTHLY.

New Cement Plant Opened

A new cement plant has been opened in Seattle, Wash., by the Permanente Cement Co. of Permanente, Calif. Costing more than \$500,000, facilities include a dolphin pier, silos, storage space, a sacking plant, railroad spurs, truck-loading accommodations, and an office building. Kaiser Engineers, Inc., designed and supervised erection of the new plant; it was constructed by Kuney-Johnson Co. of Seattle, general contractor.

Bulk cement will be pumped from ships into silos by a Fuller-Kinyon pneumatic pumping system. Located under the silos are tunnels used to house the pumping equipment and transfer cement from silo to bag-packer bins or bulk-loading bins.

Permanente Cement Co. is owned by the following stockholders: General

Construction Co. of Seattle, of which J. A. McEachern is President; Morrison-Knudsen Co., Inc., which maintains Seattle offices; Pacific Bridge Co.; J. F. Shea Co., Inc.; Clarale Co.; The Utah Construction Co.; Henry J. Kaiser Co.; and The Kaiser Co.

The new division will be under the direction of E. H. Kendall, with offices at the Seattle location. Kendall joined Permanente Cement Co. in 1943 and has been associated with the cement industry since 1933, when he was employed by the Pacific Coast Aggregates Co. during construction of the Golden Gate Bridge.

Renews Factory Tours

Caterpillar Tractor Co. has announced that escorted plant tours of its Illinois factory in Peoria have been reinstated after wartime restrictions. All who will be in that territory are invited to take advantage of this opportunity to see how diesel engines, tractors, motor graders, etc., are built.



The range of a VICTOR welding torch is so great, even this picture fails to do it justice...write for VICTOR folder Form 43.

VICTOR EQUIPMENT COMPANY, 844 FOLSOM STREET, SAN FRANCISCO 7, CALIF.

MAGIC CARPET



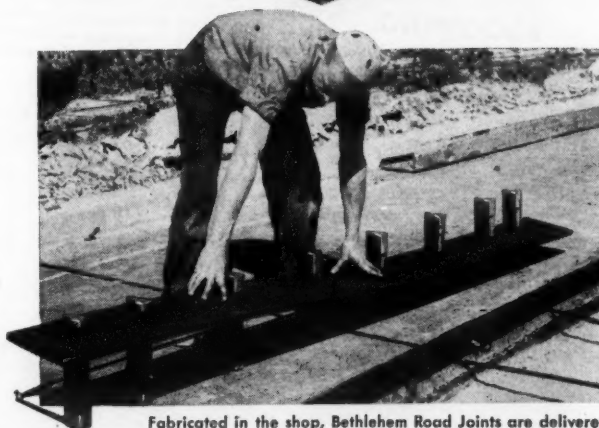
The photograph above was taken during construction of the four-lane Paxtonia-Manadahill, Pa., section of U. S. 22, a modern magic carpet connecting New York City with Cincinnati, Ohio. This stretch of the 665-mile highway was built by Buffalo Gravel Corp., Camp Hill, Pa., under the supervision of Ralph Daniels. Bethlehem road steels were used throughout.

Bethlehem supplies every form of steel needed in the construction of a highway or highway bridge. When you order steel for a highway contract from Bethlehem your order is handled as a unit, with shipment scheduled so that each individual item arrives at the project as it is needed. Costly follow-ups are avoided, and bookkeeping is minimized.

Many contractors make a habit of ordering all their road-steel needs from Bethlehem. Bethlehem Steel service saves them time and money. Next time you need steel for a highway job, or a bridge, put your requirements up to us.

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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation



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STEEL for HIGHWAYS





SUPERVISING the runway construction at the new giant air terminal at East Boston, Mass., were, in the usual order, John DeMatteo of the M. DeMatteo Construction Co., Quincy, Mass., contractor for the gravel foundation; Julius Walkman, Resident Engineer for the Massachusetts Department of Public Works; Martin DeMatteo, also of the DeMatteo firm; and Louis Capone, Superintendent for B. Perini & Sons, Inc., Framingham, Mass., which had the contract for the stone base and paving of the 7,000-foot runways.

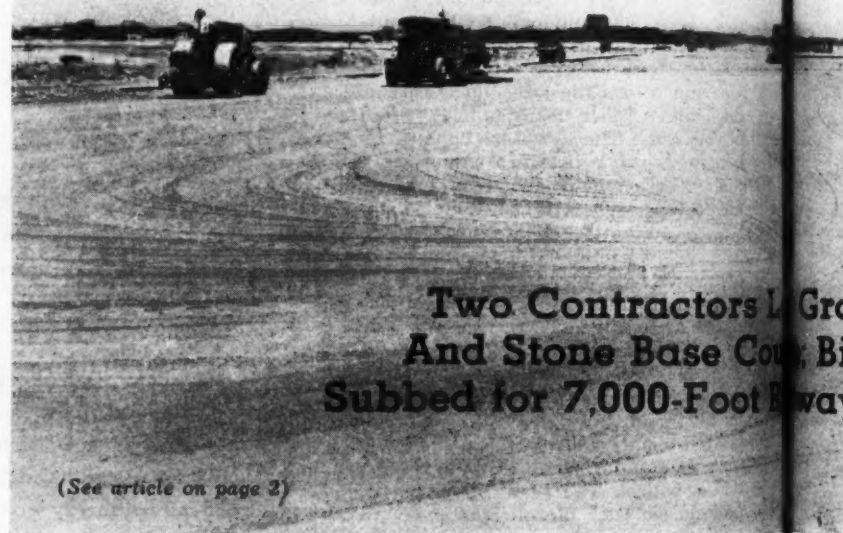


GRAVEL FOUNDATION. A foundation course of gravel averaging 4 feet in depth, spread over the full 300-foot width of the runways. About 1,100,000 cu yds of gravel was hauled to the airport by M. DeMatteo Construction Co., using as many as 850 trucks. Here the foundation material is leveled off by a LaPlant-Choate bulldozer on a Caterpillar D7. In background, a Gallion 101 power grader brings the gravel to final grade in preparation for the stone base course.



BROOMING. In addition to rolling, a broom drag was used to help work the dust well down into the stone. It consisted of a 9 x 12-foot wooden frame with four brooms of 6-inch fiber bristles. It was weighted with a box of stone carried on top. A rubber-tired Euclid was used to pull the drag.

Paving at New



Two Contractors Lay Gravel
And Stone Base Course, Bit
Subbed for 7,000-Foot Runway

(See article on page 2)



APPLYING ASPHALT. To the stone base, 1½ gallons of 85 to 100-penetration asphalt per square yard was applied by an Etnyre 1,000-gallon distributor on a Mack truck. The Trimount Bituminous Products Co. of Everett, Mass., handled this phase of the work at the East Boston Airport.



COVER COAT. The hot asphalt was then covered with pea stone from ½-inch down to No. 8. Here a Temple truck distributes the fine stone at the rate of 20 pounds per square yard. This stone was well rolled into the asphalt and base course.



BASE COURSE. Laying the stone base course was part of the B. Ferini & Sons contract. A contractor-built spreader box on the front of a D7 tractor received the crushed stone from the trucks and spread it on the gravel foundation. Two small wheels at the front of the box enabled the tractor to push it along easily. About 2,000 tons of stone for the 6-inch base course was laid by this box in an 8-hour day.



STONE DUST. The stone was compacted by three passes of a D8 tractor. Then the interstices were filled with a fine stone dust from Buckeye spreader boxes hooked to the backs of the trucks. Here a Ward LaFrance truck with 15 tons of stone dust discharges its load. Further compaction followed, then more dust was added, and the base rolled until the 6-inch course was firmly bonded.

er Air Terminal

ors L Gravel Foundation
e Com Bituminous Paving
oot Ways at Eastern Airport

(C. & E. M. Photos)



COMPACTION. The bottom course of crushed stone was topped by another layer of stone 4 1/4 inches deep. Here an 18-ton Buffalo-Springfield rolls the top course of stone, while in the background a Galion 12-ton 3-wheel roller works on the first layer to which stone dust has been added.



BITUMINOUS PAVING. John McCourt Co. of Boston was given the subcontract for laying the bituminous-concrete paving on the runways at the East Boston Airport. From this company's new Cummer asphalt plant, the hot-mix was transported by truck to the field where it was laid by two Aduna Black Top Pavers. Here one of these machines spreads the first course in 12-foot lanes. The material was compacted to 1 1/4 inches thick, while the top course has a 1-inch compacted thickness.



ROLLING. Longitudinal rolling of each course of hot-mix was done by this 18-ton 3-axle Buffalo-Springfield, while an 8 to 10-ton Buffalo-Springfield tandem handled the cross rolling. The two runways included in this contract at the Logan International Airport at East Boston are 7,000 feet long and 300 feet wide.



This 8-inch hydraulic suction dredge for small jobs is built by Higgins Industries, Inc., either as a complete unit or as a knock-down portable hull.

New Hydraulic Suction Dredge for Small Job

An 8-inch hydraulic suction dredge is now being built by Higgins Industries, Inc. It is designed for small dredging projects on which the advantages of economical material movement are desirable, but which do not justify the use of larger dredges.

The dredge is built either as a complete unit or as a knock-down portable hull. In the portable design, which permits hauling by rail or motor truck from job to job, the hull comes apart in five integral watertight sections: the main hull and machinery compartment is 11 feet wide x 34 feet long x 5 feet deep; and the four side compartments are 2 feet 9 inches wide x 20 feet long x 5 feet deep. Erection is by bolting. In order to disassemble the dredge it is not necessary to disturb any of the machinery. Even the unit hull is not too large or too heavy, the manufacturer says, to haul short distances overland.

The dredge has an overall length of 62 feet, an overall breadth of 16½ feet, and a minimum draft of 2 feet. It has a capacity of 60 cubic yards per hour and a designed working depth of 15 feet. The hull is built of ⅜-inch steel of all-welded construction, with buoyancy tanks and a ballast tank at the stern. A gantry frame is erected on the

stern to raise and lower the anchoring spuds, which are made from pipe and are concrete-filled. In order to handle the cutter ladder, an A-frame is provided on the bow.

The dredging pump is a belt-driven centrifugal of simple design for handling abrasive materials. It has an 8-inch-diameter suction and 8-inch-diameter discharge. A 100-hp diesel engine drives the pump through a multiple V-belt drive. To drive the cutter, a 23-hp full diesel engine is installed on the bow in front of the control house. The engine is connected to the drive shaft by a herringbone speed reducer, roller chain drive, and a spiral bevel gear box. All drive bearings except the cutter shaft itself are antifriction ball and roller bearing. Gear units have self-contained lubrication.

For the operation of the dredge, a 5-drum hoist driven by a 23-hp diesel engine is installed under the control house. The drive to the hoist is through a herringbone speed reducer and a roller chain. Two slow-speed drums are provided for swinging lines and three high-speed drums for hoisting spuds and raising and lowering the cutter. The control levers for the hoist are in the house, and each drum has an individual clutch lever and brake lever.

All engines are electric-starting and have governor control. Cooling for engines is by air-cooled radiators. The

dredge is equipped with a full automatic-starting 110-volt ac electric plant. Two hand pumps are installed and manifolded so that the dredging pump may be primed, ballast be pumped in or out, and the bilges pumped.

For further information, write to the manufacturer at 521 City Park Ave., New Orleans, La.

Stewart Elects Executive

James M. Jensen has been elected to the newly created executive position of Assistant to the President of James Stewart & Co., Inc., engineers and contractors. Mr. Jensen has been associated with Stewart for 31 years, having joined the organization after his graduation from Yale University and Sheffield Scientific School in 1915.

He has superintended the construction of many of the office, industrial, and institutional buildings erected by Stewart, including all the plants which the company has built in recent years for Linde Air Products Co.

300-Amp Welder Has Gas and Electric Power

A new 300-ampere welder has recently been announced by Hobart Brothers. The model features a gasoline engine and an induction motor for use as alternative power sources. Thus the welder can take advantage of electric power when available; or he can use the gasoline engine should electric power lines fail or be unavailable.

Set on a portable mounting, the new Hobart unit has a 20-hp motor and a 6-cylinder Chrysler industrial engine joined by an over-running clutch coupling. The free-wheeling of the clutch, when the engine is not in use, is entirely automatic, Hobart says. The induction motor is wound for dual voltage, 220 or 440. An idling device is supplied with the gasoline engine.

Full details on this Hobart unit can be secured from the Hobart Brothers Co., Box CE-126, Troy, Ohio, on mention of CONTRACTORS AND ENGINEERS MONTHLY.



THE HIGHWAY MODEL DD MOTOR DRIVEN SAND AND CINDER SPREADER

The Model DD Highway Spreader clamps onto the tail gate of any standard dump truck permitting one man to cast a uniform swath of sand or cinders 8 to 60 feet wide at truck speeds up to 35 miles per hour. Simple adjustment keeps spreader in horizontal position to cast material under and ahead of rear truck wheels permitting truck to travel ahead of traffic with safety. Material is fed into hopper by gravity—no shoveling is required. Unit is equipped with adjustable feed gates controlling thickness of spread and the throttle on the 1½ H.P. Briggs and Stratton gasoline motor determines the width of spread. Widely used for ice control work in winter, the Highway Model DD is also ideal for seal coat work and dust control in summer. Write for descriptive literature.

THE HI-WAY MODEL R MATERIAL SPREADER Offers these time-saving profit-making features

● Spiral feed roller with agitator-conveyor provides fast, accurate distribution of material. Adjustable feed gate controls desired thickness of spread. Width of spread is adjustable from one foot to full width of spreader.

● Reversible transmission on both feed roller and agitator-conveyor permits quick and easy change from forward to reverse motion simply by shifting lever.

● Swivel type self coupling adjustable hitch allows traction wheels to remain in constant contact with ground regardless of position of truck or spreader. Entire unit is balanced for easy hook-up to truck.

WRITE FOR COMPLETE DETAILS

HIGHWAY EQUIPMENT COMPANY
601 D Avenue, N. W. Cedar Rapids, Iowa

Manufacturers of the world's most complete line of spreaders

Sold and distributed by leading Construction Machinery Dealers throughout the United States and Foreign Countries:

Prevent CONCRETE CRACK-UP!

Seal Your Expansion Joints With PARA-PLASTIC

The Positive and Permanent Seal All Year Around

Para-Plastic is a hot-poured material that forms a rubbery, resilient, adhesive and cohesive plastic. Para-Plastic is poured as a top seal in conjunction with the non-extruding premolded KORK-PAK fiber expansion joint filler. This combination is the positive and permanent method to secure a waterproofed joint.

Para-Plastic bonds firmly with any form of construction—and maintains a perfect seal during sub-zero temperatures. Para-Plastic is the positive seal all year around against the infiltration of water or any other substance. Specified for general construction for many years by leading engineers throughout the country.

We shall gladly furnish any technical requirements.

Para-Plastic being poured into expansion joints in floor of concrete pool.



SERVICISED PRODUCTS CORP.
6051 West 65th Street, Chicago 38, Ill.

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Contract Clause Defines

Arbitration Timeliness

Here is another one of those frequent cases in which an agreement to by-pass the courts by providing for arbitration of disputes arising under a construction contract results in the growth of two legal weeds where but one otherwise would have grown. In short, two lawsuits became necessary: one to determine the binding effect of an arbitration agreement; and one to determine the merits of the controversy after the arbitration agreement was declared to have been abrogated.

In this case (City of Detroit v. A. W. Kutsche & Co., 309 Mich. 700, 16 N. W. 2d, 128) the City successfully sued to enjoin arbitration proceedings initiated by the defendant contractor, who had constructed sewage facilities for the city. The City was upheld in its contention that the right to arbitration was waived through the contractor's failure to take timely steps for it, as required by the contract. The principal contract clauses bearing on this point were to the effect that disputes should be arbitrated before being sued upon; that damage claims must be made within a reasonable time after detection of the damage, and not later than the time of final payment; and that such claims should be adjusted by arbitration. Here are the high spots of the opinion embodying these points:

"If parties desire arbitration, courts should encourage them, but the nature of such a contract requires faithful compliance with its terms, otherwise the parties will find themselves in the forum they sought to avoid. . . .

"The benefit that plaintiff, the City, would derive from timely notice of a claim is that while the controversy was fresh, the engineers and others could see the status of the construction still in progress, and witnesses would still be available and would possess a better recollection of the matters. In consequence, the plaintiff could seasonably demand arbitration and better present its case. Demand for arbitration could not be made until the claim was presented."

Construction contracts peculiarly lend themselves to arbitration of disputes, which should be promptly determined by someone having special knowledge of such matters who can act upon personal knowledge of the controlling facts.

Specific contract provisions for arbitration of disputes as they arise during the progress of the work negative mutual assent to general arbitration after the work is completed, covering all such controversies.

A contractor who has failed to comply with conditions which would entitle him to timely arbitration of disputes arising under a contract cannot afterwards have arbitration without the consent of the other party.

Under the circumstances, right to arbitration was lost. But the contractor could and did still maintain suit to establish his damage claims, exactly as if the contract had not contained any arbitration clauses.

Contractor Is Refused

Sales-Tax Reimbursement

In a settlement of accounts on a state parkway job, the contractor unsuccessfully argued that he should be reimbursed for the amount of sales taxes paid. The New York Court of Claims dismissed the argument and the claim based upon it. It said: "If claimant's officers were unaware of" the New York City sales-tax law "when they prepared their bid, they must be presumed to have had knowledge thereof. Anyway, the State's failure to notify bidders that such a tax would be imposed was not a fraudulent concealment of a material fact affecting the nature and cost of the work. We do not agree with counsel's argument that because the city has had the benefit of the parkway the State should make good to the contractor the amount of the tax it paid to the city." (A. W. Banko, Inc., v. State, 60 N.Y. Supp. 2d, 763.)

Prior Appropriation Made

For Public-Work Contract?

Approaching a contract with a municipality or other public body is akin to approaching a railroad crossing where one is supposed to "Stop, Look, and Listen". But there is this important distinction: in approaching a railroad crossing one need be on the lookout only for a train. Need for alertness in every direction is suggested by a decision lately rendered by the Appellate Court of Illinois, Second Circuit, in the case of DeLeu, Cather & Co. v. City of Joliet, 64 N. E. 2d, 779.

In many states, as in Illinois, there are statutes to the effect that a contract for municipal or other public work cannot legally be entered into, if it is to be paid for out of general funds, unless an appropriation

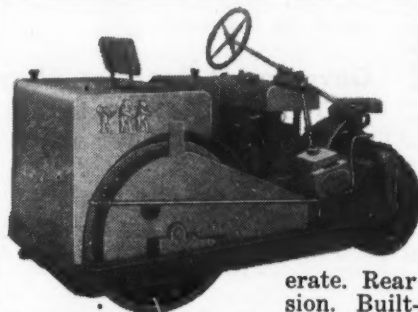
has been made to discharge the cost. In the Joliet case, the City defended a claim made by plaintiff for engineering services performed before abandonment of a waterworks project that was to have been paid for out of a Federal PWA loan. (It would seem that the same legal principles would have been involved had this been a suit by a contractor to recover for work done on the job.) Deciding the case in favor of the plaintiff engineering company, which had lost in a lower court, the Appellate Court ruled that the City was wrong in claiming that a prior appropriation was essential to the validity of the plaintiff's employment. Said the higher court:

"Briefly summarized, the facts show that appellant [plaintiff] was employed by the City Council . . . to do the engineering services; that it performed the preliminary services; that it was to be paid from the proceeds of the Federal loan and grant, and not from the general corporate fund; and

that the employment was never rescinded. Under the law no prior appropriation was necessary, and neither the project nor the employment of the engineer created any debt of the city beyond any constitutional or statutory limitation. The employment was therefore legal."

The Appellate Court added that since no agreement had been reached as to the amount of compensation to be paid for the services, the engineering company was entitled to collect reasonable pay.

Although the company won the suit, the (Concluded on next page)



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Variable Weights

Engineered for economical operation where the going is tough. Compact, easy to operate. Rear roller gives heavy duty compression. Built-in water tanks for wet rolling.

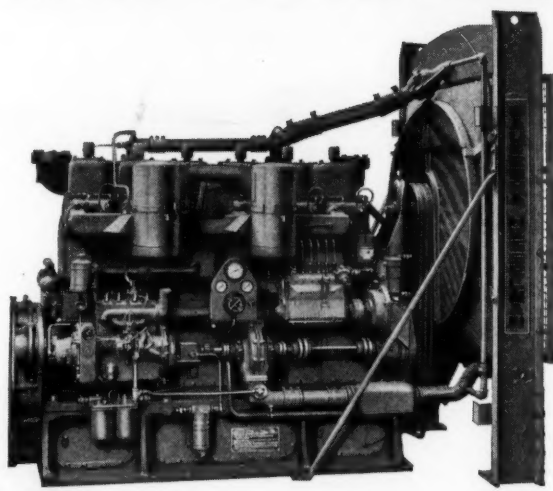
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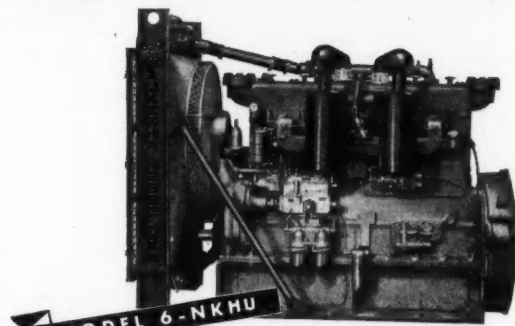
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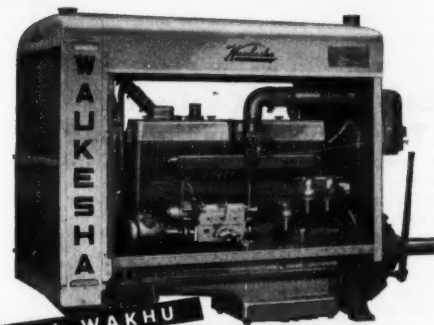
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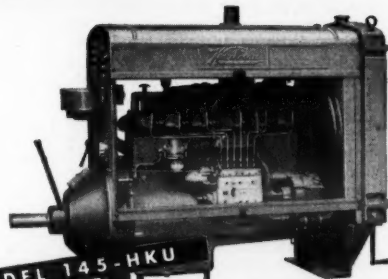
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Ingersoll-Rand Portable Compressors with Waukesha-Hesselman power have proved to contractors all over the world the advantages of these oil engines:

1—Burns safety diesel fuels, distillates, domestic furnace oils Nos. 1, 2 or 3.

2—Starts with Electric Starters . . . even the big 300 hp. engine . . . in coldest weather. Press the button—and it's under way.

3—Should Gasoline or Butane be the preferred fuel, it may be converted—without change of pistons, rods, cylinder heads or any internal part.

4—Electric Spark provides positively timed ignition—eliminates need for high compression to

fire diesel fuel. The result is longer life, less wear, lighter weight. Moving parts last longer, cost less for replacement.

5—Lower Compression and Explosion pressures remove destructive torque reversals from the driven machine and reduce upkeep.

6—Lower Pressures make lighter flywheels and other moving parts possible; improve performance by giving quicker pick-up, higher speed, increased output. A Hesselman is even livelier than a gasoline engine of the same size.

7—Waukesha-patented non-sticking piston rings make the Hesselman an all-season, no shut-down power unit.

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Power Unit Model	No. of Cyls.	Bore and Stroke, In.	Displ. Cu. In.	Speed RPM
*130-HLU	4	4 x 5	251	800-2000
*VRZHU	4	4 1/2 x 5 1/4	353	800-1600
*140-HKU	6	4 1/2 x 5 1/2	525	800-1800
*145-HKU	6	5 1/4 x 6	779	800-1800
6-WAKHU	6	6 1/4 x 6 1/2	1197	800-1600
6-NKHU	6	7 x 8 1/2	1962	600-1050
6-LRHU	6	8 1/2 x 8 1/2	2894	600-1050

*These Hesselman Engines can be converted to burn butane or gasoline, with no internal changes. The others can also be converted without internal changes, provided manifolds and accessories for carbureted fuels are applied.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES

Avoid Legal Pitfalls

(Continued from preceding page)

litigation should serve as a valuable reminder to all who deal with any public body concerning construction projects. A careful check should be made as to the right of the public authorities to enter into an agreement, in the light of possible statutory and constitutional provisions which limit power to enter into contracts without first setting aside, by appropriation, the necessary funds, or without first securing electoral assent or similar action.

Account Books That Constitute Legal Proof

Where a contractor's or other claimant's right to collect for labor or materials depends upon his proving the accuracy of particular items, he must often depend upon his books for proof. But under the statutes of most, if not all, of the states, there is a certain formula that must be observed before books constitute valid proof.

Typical of these statutes is one in force in Iowa. It provides that "books of account containing charges by one party against the other, made in the ordinary course of business," are receivable in evidence under certain conditions: (1) if they show continuous dealings or several items of charge; (2) if the books are sworn to as being those of claimant; (3) if it is shown that the charges were made on or near the dates specified in the books, unless failure to make that showing is excusable and excused; (4) if the items be verified, by the person who made the entries, as being just and true, or the reason given why not so verified.

In a case lately decided by the Iowa Supreme Court (*Berg v. Kucharo Const. Co.*, 21 N. W. 2d, 561) it was ruled that a contractor's daily work record, properly verified as provided by the statute, constituted legal proof under the following stated circumstances:

Plaintiff contractor testified that it was the daily record he kept in his own handwriting on the job involved; that it showed the time worked by his various employees, the particular tasks upon which they were working, the hours and labor charges; and that the items and charges were correct. Each of the foremen on the job testified that he kept a time account covering the men under his supervision, and that he noted the same on scratch-paper slips or boards and reported it correctly each day to plaintiff. (The slips of paper or boards were usually, thrown away.)

This brief discussion should inspire any contractor, who has not assured himself that he is keeping records in such form and detail as to make them legal evidence in a pinch, to check with his local lawyer as to just what changes, if any, should be made in his bookkeeping system.

State Requires Contractor To Carry Indemnity Bond

A state contract for the construction of highway bridges in Montana required the contractor to carry public liability insurance "to indemnify the public for injuries or damages sustained by reason of the carrying on of the work". Defendant surety company issued to the contractors a policy which limited liability for automobile accidents to those arising in the immediate places where the contract job was being carried on.

Two motorists were killed in an automobile accident 12 miles from the nearest construction site. The accident was caused by careless driving of the contractors' employee, who was at the wheel of a car then being used to carry out the construction job. Holding that the defendant surety company was liable on its bond, the United States Circuit Court of Appeals, Ninth Circuit, rendered a decision embodying the following principal points (*United States Fidelity & Guaranty Co. v. Doheny*, 123 Fed. 2d, 746):

The requirement for a bond "was intended for the protection of the general public, not for the safeguarding of the State in its capacity as a party to the contract. Aside from its immunity from suit, the State as a party had no legal responsibility for damages suffered as a result of the negligence of an independent contractor. . . .

"While contractors are liable under general law for damages caused by their negligence and are obliged to respond independently of any agreement with the state, it is to be assumed that it was a matter of state policy to require the carrying of public liability insurance as a measure of precaution against possible financial irresponsibility on the part of contractors."

Although the policy that had been issued limited liability for automobile accidents to those occurring at the construction sites, it would have been a species of fraud upon the State to exclude coverage in this case. Defendant company knew what sort of

bond the contract required. Its letter to the State Highway Commission stating that it had issued a bond justified the Commission in assuming that that requirement was met by the bond issued.

Government-Contract Wage Question Not Up to State

An employee sued a Government contractor to recover a deficiency in wages, allegedly paid him. A trial court in Kansas awarded judgement in the employee's favor on determining his proper classification and the amount of wages that should have been paid him. But, on appeal, the Kansas Supreme Court ordered dismissal of the suit.

The grounds were that under a provision of the contract, the United States Secretary of Labor had exclusive jurisdiction to determine the employee's classification and the amount of wages to which he was entitled. (*Kelly v. Grimshaw*, 167 Pac. 2d 627.)

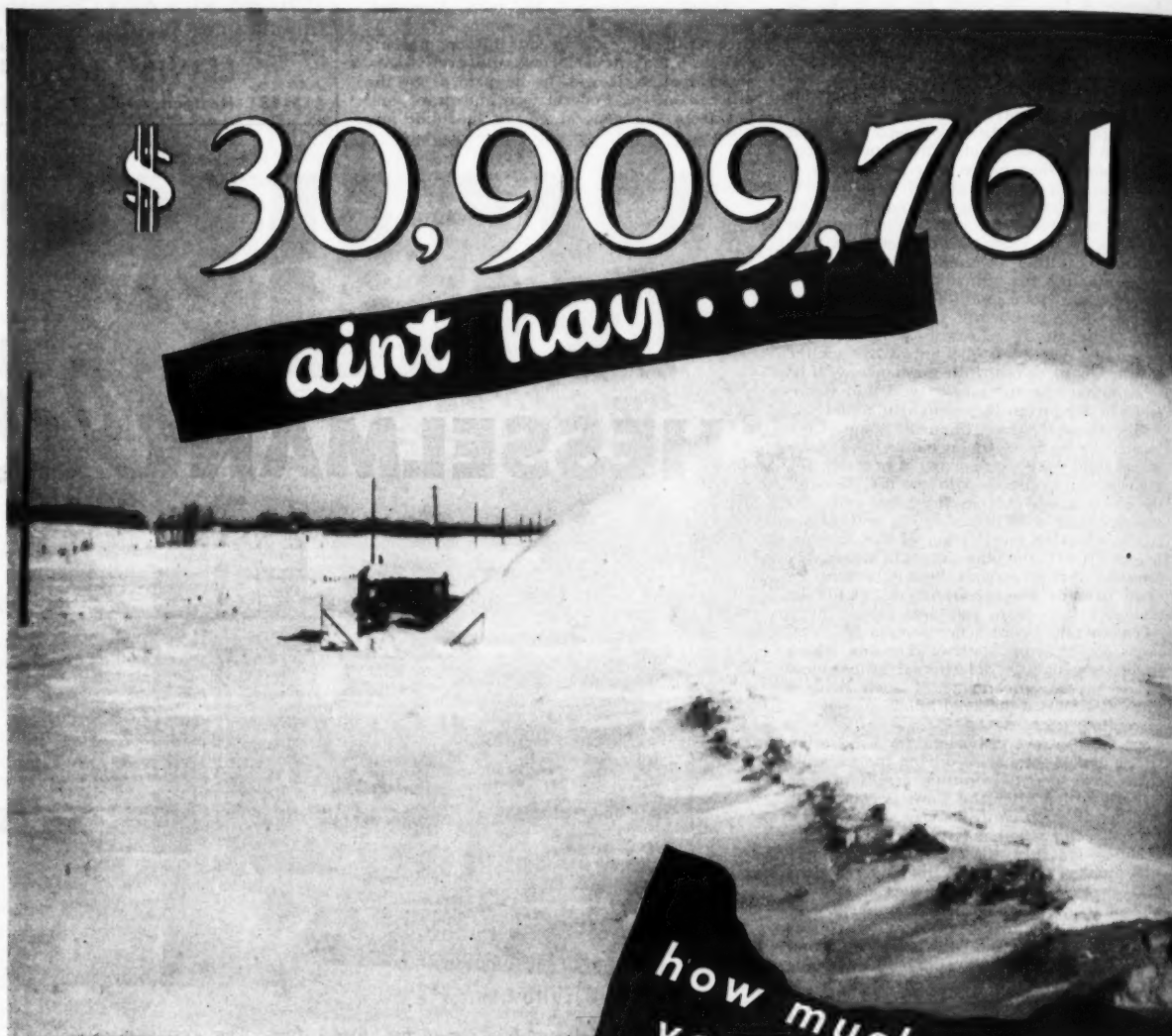
Useless Undoing of Wrong Act Not Required by Court

The courts have frequently declared that they will not enjoin one from doing an act which he is not threatening to commit when the suit is brought. And the courts need not require the undoing of an act when no useful purpose would be served. These rules of law were brought into play in a Massachusetts case where a highway-contracting firm removed gravel, thereby creating a pit, in violation of a town zoning ordinance. (*Town of Saugus v. B. Perini & Sons*, 26 N. E. 2d, 1.)

The evidence showed that removal of the gravel had ceased before the injunction suit

was brought and that the contractor did not intend to remove any more. But the court recognized that any future attempt to violate the ordinance might be enjoined in a new suit.

Despite wrongful removal of gravel before the suit was brought, the Massachusetts Supreme Judicial Court decided that the trial judge did not abuse a discretionary power in refusing to require the contractors to fill the pit, which had become a pond. But the following reasoning of the court strongly intimates that restoration of previously existing conditions may be required where an illegal excavation creates a dangerous or unsightly situation: "The pond has been surrounded by a wire fence and has the appearance of a natural pond. In the peculiar circumstances existing in this case, and especially in view of the location of the pond, the character of the adjoining sparsely settled section" (which was undeveloped, uneven, and for the most part characterized by hills, etc.), the trial court did not err in refusing to require refilling.



That 30 million dollar figure is the last available figure on the cost of snow removal and covers the clearance of 288,999 miles of road in the winter of 1944-1945.

Snow clearance money isn't wasted money—but how many miles of that 288,999 had to be plowed out again—how many miles did you have to plow out again—that kind of snow money is spent twice! It is wasted money.

Snogo will save that kind of waste! In the picture above a road plowed out and banked up by ordinary methods is being cleared out by Snogo. When Snogo gets through the job is all done until the next snowfall. No banks are built up to blow back and require costly repeat plowing. Snogo cuts away the deep side of the drift as easily as the low side and eliminates dangerous one-way bottlenecks to the center line.

Snogo means safer, winter highways. It means savings in snow clearance and it reduces winter road damage. Plan ahead to remove your snow not just to move it.

SNOGO
A SNOGO For EVERY BUDGET

**KLAUER MANUFACTURING COMPANY
DUBUQUE, IOWA**





Shown here is a Magnaflux portable unit used in the magnetic-particle inspection of metals for hidden flaws.

Metal Parts Tested For Hidden Defects

An interesting technical development of recent years is a method for determining hidden flaws and defects in magnetic and non-magnetic metals. It is specially applicable to preventive-maintenance inspection of welds, engine or motor parts, tools, etc. Known as "magnetic particle inspection", this method has been developed and made practical by the Magnaflux Corp. of Chicago. The basic principles involved are well known to all engineers and physicists.

Running a test consists of inducing a magnetic field in the piece to be inspected, then dusting over it with finely divided ferro-magnetic particles. Next, a light stream of air is blown across the piece and where there is a crack, defect, or other flaw, the powder makes a sharp outline of the defect. The magnetic particles may be suspended in a light oil, and the suspension flowed over the part after it has been properly magnetized.

It should be noted that the flaw itself does not become visible, but that the particles, while magnetically held, form an outline or "mound" of material that is readily visible to the naked eye.

The theory behind this process, which has come to be known as Magnafluxing, is this: When a flaw occurs in a magnetized piece of material, the orderly magnetic lines of force are distorted and thereby crowded or deflected around the ends of such a magnetic obstruction. If the obstruction lies near enough to the surface of the material, some of these flow lines will be crowded outside the material itself; a leakage field will then be produced at the surface at a point over the discontinuity. It is this leakage field which attracts the powder and thus sets up a magnetically held pattern outlining the discontinuity.

In order to make the test more easily visible in certain cases, the Magnaflux powder is available in several colors. For surfaces on which these particle patterns are hard to observe, the Magnaflux Corp. has also developed a magnetic substance with fluorescent properties which will glow when placed under ultra-violet light. This substance is known as Magnaglo and is applied in suspension. The piece being tested is soaked with it and then placed under the ultra-violet lamps. Where there is a crack, the Magnaglo fluoresces, outlining the defect.

Magnaglo is especially helpful (1) when the surface is dark in color or unevenly lighted, (2) when the black or red regular Magnaflux powders and pastes offer low contrasts, or (3) on obscured surfaces, such as the interiors of circular springs, tubes, borings, etc. This process is a little more easily applied and the results are more noticeable. But inasmuch as it is carried out in a darkened area, testers cannot work for too long a period without experiencing eyestrain.

You may ask, "What about brass fittings, aluminum castings, spark plugs, and other non-magnetic materials which also need testing in order to prevent costly breakdowns to equipment after installation?" There is a method for testing these, which is put out by the

same company. In this system, known as Zyglon, a fluorescent dye is dissolved in a carrier of special penetrant. The piece to be tested is allowed to soak thoroughly in this solution, and then after washing and developing, is placed under ultra-violet light, as in the Magnaglo method. Where there is a defect, the indications glow brilliantly under the black light.

The equipment for the Magnaflux testing comes in various models and sizes. There is a portable model which fits on a truck and can be transported wherever it is desired. For those who have only an occasional need for these methods the company furnishes an inspection service with fully qualified operators, from any of its offices throughout the United States.

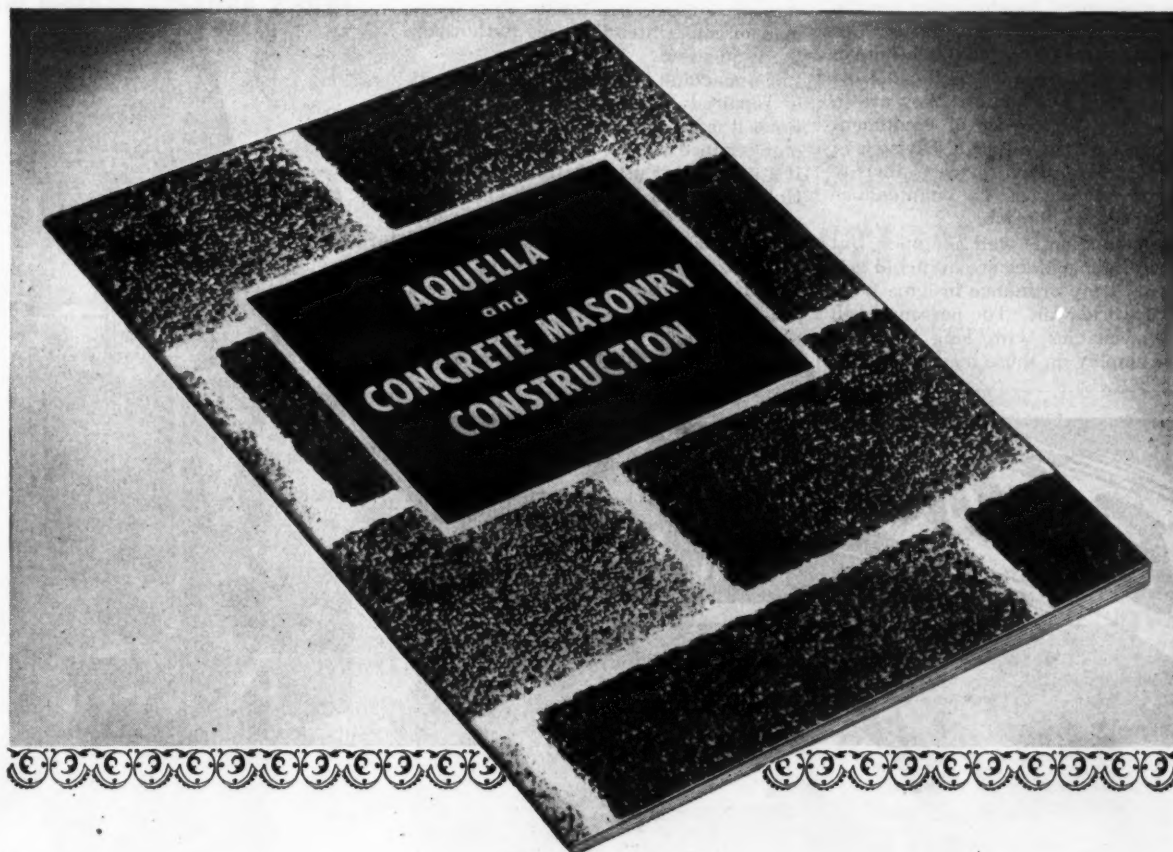
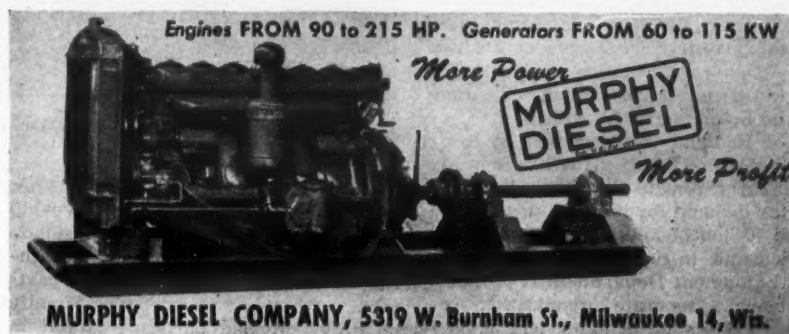
For complete information on these processes or for the answers to any questions which you may have regarding their use, write to the company at 5900 Northwest Highway, Chicago 31, Ill., and mention this report in CONTRACTORS AND ENGINEERS MONTHLY.

Entire Jack Line Listed

A new 40-page catalog gives complete descriptions, data, and specifications for all jacks made by The Duff-Norton Mfg. Co. It covers improvements made on standard jacks and new additions to the line. Described and illustrated are each of the various types of Duff-Norton ratchet, screw, air-motor-operated, and hydraulic jacks.

Also shown are details on the improved automatic lowering mechanism; the improved journal jacks; and a new 50-ton general-purpose screw jack of the inverted type.

Readers of CONTRACTORS AND ENGINEERS MONTHLY may obtain this catalog by dropping a card to the manufacturer. The address is Box 1889, Pittsburgh 30, Pa. Mention this report and request Catalog 203.



This 16-page brochure shows how and why Aquella is used throughout the Nation to control water seepage and dampness

Here is the new 16-page brochure, "Aquella and Concrete Masonry Construction", that will be welcomed by members of the construction industry. Highly informative, it brings a wealth of technical data on Aquella...the principle on which it works to control dampness and seepage on all porous masonry surfaces—plus many interesting examples of the ways it is being used throughout the nation. For your copy, simply fill in and mail the coupon at right.

PRIMA PRODUCTS, INC.

NATIONAL DISTRIBUTORS

10 East 40th Street • New York 16, N. Y.

PRIMA PRODUCTS, INC., Dept. X
10 East 40th Street, New York 16, N. Y.

Please send my free copy of "Aquella and Concrete Masonry Construction".

Name.....

Address.....

City..... State.....

Maintenance Districts Rent State Machines

Equipment Department Furnishes
And Repairs Machines Used for
Road Maintenance; Typical Shop

† STATE-OWNED machines, purchased in the open market by competitive bids, are furnished on a rental basis to the maintenance crews of District VII, California Division of Highways. They are cared for by a shop and garage of the Equipment Department.

The Equipment Department owes its existence to this practice of renting equipment, and its budget is balanced by the demand for its machines. Aside from its job of keeping various makes of machines in repair through its shops, the Equipment Department is proudest of being a separate organization, responsible to state headquarters in Sacramento. Its key employees move about with a consciousness of this distinction.

The mechanical headquarters for the southern California counties of Los Angeles, Ventura, and Orange is known as Shop 7, and is located in North Hollywood. Kept here, unless they are in use, are the 461 pieces of equipment furnished by the California Division of Highways. Equipment in use ordinarily is stored in one of 23 maintenance yards, or left on the job.

This main shop is well equipped, but many of the machines are quite old and still bear Army ordnance insignia from the first world war. The personal skill which mechanics with long years of service employ on these machines more



C. & E. M. Photo

Here is the inside of the North Hollywood, Calif., shop, with mechanics at work.

than makes up for age, however.

Chief among the repair problems are parts, since under the competitive-bid system it is utterly impossible to standardize even in tractors. One entire section of the shop is devoted to a parts room, with two storekeepers normally on duty. Myriad parts are stored in separate steel bins and classified. When spare parts or tools are checked out, they are signed for after the shop foreman or superintendent has authorized the requisition.

If a machine breaks down on a job, it is repaired there if possible. Many times it is taken to the yard of a district maintenance station if one is close by. If a pick-up or a truck from the North Hollywood shop can reach the machine and haul its damaged part, repairs are made in that way. The shop uses about 35 men, although sometimes not more than 10 are to be found there. The rest are out on jobs. Equipment which needs a major overhaul is, of course, brought in to North Hollywood on a

low-bed trailer reserved for that purpose.

The quantity and kind of equipment rented by a maintenance station is fairly constant, and its rental goes on from day to day while it remains there. When any item of importance is added to a piece of equipment as a part of its re-

pair, the Equipment Department prepares a card describing the operation in detail. These cards are filed by equipment number, and are in an active folder for one year. Then they are filed with past cards which date from the purchase of the equipment, so that in case of major repair, or if some question arises, the information needed is on file.

Shop Equipment

The North Hollywood shop does all kinds of major repair from the grinding of valves and re-boring of cylinders to major overhauls on shovels and tractors. When the shop was visited for *CONTRACTORS AND ENGINEERS MONTHLY*, it was equipped with the following machines:

- 1 No. 2M Cincinnati milling machine
- 1 cylinder grinding machine
- 1 Ingersoll-Rand 6 x 5 air compressor, single-stage, electric-motor-driven
- 1 Brown & Sharpe No. 13 piston grinder
- 1 Rockford drill press
- 1 Steptoe shaper
- 1 flat-bed planer
- 1 engine lathe, 14-inch

(Concluded on next page)

HERE'S ANOTHER REASON WHY CARVER PUMPS ARE BETTER



NON-RECIRCULATING
NON-CLOGGING
NON-QUITTING

Carver Pumps are offered with a choice of power and mounting in sizes from 1½" to 10". Write for catalog.

CUTS PUMPING COSTS

CARVER PUMP CO.
Muscatine, Iowa

ERADICATOR FOR RED INK



One of several LINNS used on a large project in the Blue Ridge Mountains. Note the reverse driver's seat for high speed reverse driving. Faster spotting, saves time, saves turning, in getting to the dump.

It doesn't take long for idle equipment to put you in the red. Costs don't stand still while the weather's bad, while repairs are being made to conventional equipment that just can't take the tough going. Delays cost money whether or not there are penalty clauses.

LINNS keep you out of the red because they work and earn every day. They carry the payload regardless of weather conditions, wheel-stopping footing or grades. The LINN unit provides maximum traction because it is flexible, not rigid. It fits itself to irregular ground, rocks, snow or

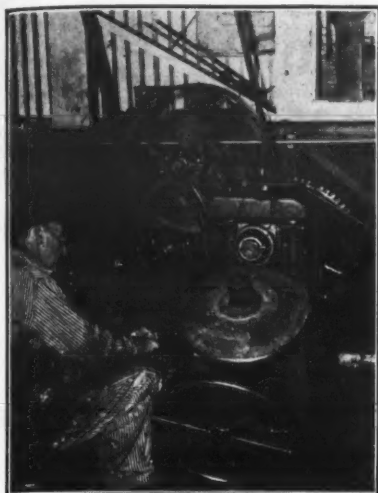
ice, and, with full load, can take steep grades (25% to 35%). Every day throughout the year, the LINN carries its payload.

Capacities range from 5 to 50 tons, amply powered with gas or Diesel engines. LINN Hafraks are available with body styles for all types of work, or can be furnished with supplementary equipment, such as shovels, cranes, winches, pumps or compressors or units mounted on the chassis. For technical information and specifications, write to our General Sales Office, 250 West 57th St., New York 13, N. Y.

LINN MANUFACTURING CORPORATION MORRIS, N. Y.
MANUFACTURERS OF HAFTRAKS FOR OVER THIRTY YEARS



**CONTOUR
TRACTION**



C. & E. M. Photo
This power roll, part of the blacksmith-shop equipment, sharpens mild-steel disk blades.

Maintenance Districts Rent State Machines

(Continued from preceding page)

- 1 LeBlond 18-inch engine lathe
- 1 Canedy-Otto drill press
- 1 Robertson power hack saw
- 1 U.S. electric grinder, 12-inch, 2 wheels
- 1 Baldor bench grinder
- 4 bench vises
- 1 Shepard-Thomson brake-lining machine
- 1 spark-plug cleaner
- 1 distributor synchronizer
- 1 small Marshalltown shear for sheet metal
- 1 Van Dorn electric bench grinder
- 1 Walker 4-post electric automobile lift
- 1 2-ton chain hoist

The blacksmith shop, which is in connection with the main building, contained these items:

- 1 Hobart electric welding machine, 200-ampere
- 1 oxyacetylene welding outfit
- 1 blacksmith forge
- 1 anvil
- 1 blacksmith ring cone
- 1 power hack saw
- 1 Autostart grinder, 14-inch, 2 wheels
- 1 Little Giant 50-pound power hammer
- 1 scarifier-disk sharpener, with power rolls for soft disks

Rental Equipment

The Department keeps the following list of machines which are so constantly in service that very few of them were in evidence in the North Hollywood yard:

- 1 Snogo snow plow
- 243 automotive units, including passenger cars, station wagons, dump trucks, etc.
- 12 backfillers
- 1 clamshell buckets, 1/2-yard
- 2 weed burners
- 5 portable air compressors
- 13 jackhammer drills
- 1 Ford V-8 engine
- 1 Barber-Greene bituminous finisher
- 21 motor graders
- 20 pull-type graders
- 3 disk harrows
- 2 gasoline-engine-driven power hoists
- 32 asphalt kettles
- 3 electric light plants
- 1 Athey loader
- 2 marking machines
- 1 Seaman Pulvi-Mixer
- 2 concrete mixers, 1-sack
- 2 concrete mixers, 3-sack
- 6 highway mowers
- 2 paint-spray outfits
- 18 snow plows (Western, Baker, North Star, Frink, Ross, Wausau, and Austin-Western)
- 4 self-priming pump units
- 4 rollers (Austin, Ferguson, Galion)
- 1 sandblasting outfit
- 1 Wade drag saw
- 5 Baker scarifiers
- 1 Northwest 1 1/2-yard shovel
- 1 Michigan 1/2-yard shovel

HYDRAULIC HOSE

COUPLED WITH PERMANENT OR REUSABLE COUPLINGS

Equip your road equipment, snow plows, etc., with dependable and highly flexible hose assemblies. Factory assembled units with permanent couplings are available from 3/16" I.D. to 1 1/2" I.D. inclusive in high pressure, medium pressure, or low pressure constructions.

For emergency repairs and field service have our clamp type reusable couplings available. Just use two automotive wrenches and a vise (if handy) for attachment to high pressure hydraulic hose. You can purchase these easy-to-assemble couplings for 1/4" I.D. through 1" I.D. hose sizes.

ANCHOR COUPLING CO., Inc.

342 N. Fourth Street Libertyville, Illinois
Factory Branch
12303 Cloverdale Ave., Detroit 4, Michigan

- 1 Speeder 1/2-yard shovel
- 1 Hardie sprayer
- 3 sand spreaders
- 3 street sweepers
- 18 tracklaying-type tractors (Caterpillar and Allis-Chalmers)
- 11 wheel-type tractors
- 5 wheel-type tractors with front-end loaders
- 1 low-bed trailer
- 3 trailers, 1 1/2-ton
- 3 concrete vibrators

Personnel

The Equipment Department operates under the direction of Equipment Engineer R. H. Stalnaker, with headquarters in Sacramento. C. H. Purcell is the Director of Public Works, and George T. McCoy is the California State Highway Engineer. W. B. Cannon is Superintendent of the North Hollywood Shop.

Snow and Ice Removal

The rock-salt method of removing snow and ice from paved surfaces is the subject of a new leaflet entitled "Snow and Ice Removal on Highways, Streets, and Airport Runways", issued by the International Salt Co., Inc., distributor



C. & E. M. Photo
A Shop 7 mechanic works on a tractor clutch with this 18-inch LeBlond lathe.

of Sterling rock salt. The leaflet outlines recommended application procedures. It is available on request from

the company offices at Adams and Thomas Sts., Scranton, Pa. Mention this notice.

Use J A Q U E S Equipment

TO SPEED

CONSTRUCTION JOBS

If it's a big job like constructing a telephone, power line, or drilling foundation holes, THE J A Q U E S HYDRAULICALLY CONTROLLED EARTH BORING MACHINE below will do the job faster, easier, and better—at a saving in time, manpower, and cost. Note some of its principal features:

1. ALL PLUMBING is hydraulically controlled, enabling faster operation and transportation from hole to hole as machine can be instantly lowered to traveling position, and again quickly placed in operating position regardless of the unevenness of the terrain.
2. FASTER DRILLING, as the hydraulic feed maintains a constant pressure on the bit maintaining the maximum R.P.M.'s on the auger without the slipping of any clutch or gears. The texture of soil controls the rate of digging.
3. HYDRAULIC PRESSURE on bit transmits less shock to machine while digging in rock or other hard-to-drill soils.
4. HYDRAULIC FINGERTIP CONTROL reduces operator fatigue to a minimum.
5. ONE MAN easily operates this machine as all controls are conveniently located.
6. PEAK OPERATING maintained hour after hour with these simple trouble-free hydraulic controls.
7. HOLES CAN EASILY be drilled at any angle.

ENGINE—Industrial Type Gasoline, approximately 30 h.p. S.A.E. Rating, with starter, generator, and battery. UNIT—mounted on steel-I-beam skids (Easily attached to or removed from truck or other conveyance). DRIVE—MECHANICAL—four forward speeds and one reverse. FEED—HYDRAULIC. LIFT—HYDRAULIC. LEVELING—HYDRAULIC. HOLE SIZE—Up to and including 24 inches. (Larger diameter on special order.) DEPTH OF HOLE—8 to 9 feet with standard machine (greater depth on special order). WEIGHT—Approximately 3900 pounds. WIDTH—4 feet, 3 inches; LENGTH—10 feet.



BLOCKS and TACKLE

Jaques Blocks and Tackle have the built-in quality and rugged strength to do the toughest jobs. Whether it's a land clearing project, a road building, oil field or construction job, you'll be able to do the job better and quicker with J A Q U E S BLOCKS AND TACKLE.



J A Q U E S

POWER SAW CO.
Highway 75 Denison, Texas

Convention Calendar

Jan. 15-18, 1947—ASCE

Annual meeting, American Society of Civil Engineers, Commodore Hotel, New York City. Col. William N. Carey, Executive Secretary, 33 W. 39th St., New York 18, N.Y.

Jan. 27-30, 1947—AGC

Annual convention, Associated General Contractors of America, Stevens Hotel, Chicago. H. E. Foreman, Managing Director, Munsey Bldg., Washington 4, D. C.

Feb. 13-16, 1947—AED

Annual meeting, Associated Equipment Distributors, Edgewater Beach Hotel, Chicago. C. F. Winchester, Executive Secretary, 1928 Eye St., N. W., Washington, D.C.

Feb. 17-20, 1947—ARBA

Annual convention, American Road Builders' Association, Palmer House, Chicago. Charles M. Upham, Engineer-Director, International Bldg., Washington 4, D. C.

Feb. 24-28, 1947—ASTM

Spring meeting, American Society for Testing Materials, Benjamin Franklin Hotel, Philadelphia. Robert J. Painter, Assistant to the Secretary, 1916 Race St., Philadelphia 3, Pa.

Production Starts On Low-Hp Engine

A new engine with a power range of 2.5 to 4.3 hp is now in production, according to an announcement from Gladden Products Corp., 635 W. Colorado Blvd., Glendale, Calif. The Model BB is an addition to the Gladden line of 4-cycle air-cooled gasoline engines ranging up to 15 hp. It has an overall height, including gas tank, of 23 inches; the width is 15½ inches, and the length is 14 inches. It requires only 2.9 cubic feet of space.

Operating parts are made of alloys proved during the aircraft-engine-building experience of the producing company, formerly Kinner Motors, Inc. A strong, lightweight aluminum alloy is used for the head, piston, and connecting rod. The crankshaft, of heavy rugged design, is forged alloy steel, dynamically balanced, with hardened and ground journals. The oversize bearings are the antifriction roller type. There are hardened-steel valve seats in both intake and exhaust-valve ports. A single casting of Meehanite alloy forms crankcase and block. The cowl is of pressed steel with a glossy, red, baked-enamel finish. The power take-off shaft is of 1-inch diameter.

Lightweight simplified mountings, and easy accessibility of controls in all positions, make the Gladden engine easy to install on any kind of equipment and in any location, the manufacturer says.

Portable Pumps

A line of portable gasoline-engine-driven pumps is described in a new bulletin from the Homelite Corp., Port Chester, N. Y. The pumps range in weight from 48 to 95 pounds; in capacity, from 4,000 to 15,000 gph. The folder features the "inside story" of the pump by means of a captioned cutaway photograph. It also includes pictures of Homelite pumps in action.

Bulletin L-501 may be obtained by sending a card to the firm.

Logan Adds Dealer

The Logan Engineering Co., manufacturer of the Aridifier, has appointed a new distributor for the territory of Arizona, New Mexico, Mexico, and Central America: the Patterson Sales Co., El Paso, Texas, engineering sales representative for machinery and industrial equipment.

The Aridifier is used in removing moisture, oil, and dirt from compressed-air lines in order to prevent spoilage of sprayed work and gumming of tools.

Shovel-Dump-Truck Unit

A folder describing the Dozer Loader made by the J. C. Plummer Co. is now available. The Dozer Loader is a combined one-man-operated shovel and dump truck. The ¾-yard shovel mounts on any 1½-ton truck, the manufacturer says, and is hydraulically operated from the cab. The folder may be obtained by writing to the company's headquarters at 224 No. Beachwood Drive, Los Angeles 4, Calif. Mention this notice.

Knight Handles Hewitt

The Knight Mfg. & Supply Co. has been appointed Hewitt Rubber distributor in Tulsa, Okla. The principal items in the line are transmission and conveyor belting and varied types of industrial hose.

The Knight agency, headed by Frank Monahan and Dean Knight, has moved to a new location at 923 E. Fourth St., in Tulsa.

WANTED: Tough Hammering Jobs!



Van Dorn Electric Hammerers drill in concrete, stone or brick—chip, clean and scale metal—gouge, shape and notch timber—drive spikes—tamp and vibrate concrete forms—scuff concrete surfaces and remove form marks—handle everything from seaming and caulking to heavy demolition. Light, compact, completely self-contained. Operate from A. C. or D. C. outlet or portable generator. Ask your Van Dorn Distributor or write for our free "Electric Hammer Handbook" to: The Van Dorn Electric Tool Co., 787 Joppa Road, Towson 4, Maryland.

For Power Specify

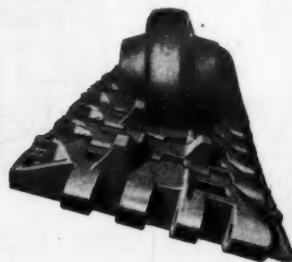
"Van Dorn"

PORTABLE ELECTRIC TOOLS

LIGHT on its feet!

Here's a big dual-drum paver that is really maneuverable! The MultiFoote DuoMix 34-E combines new paving speed and big capacity with an ability to get around on the tough jobs that is equalled by few pavers of any size... Long, wide crawlers give low ground-bearing pressure... New design for interlocking tread joints prevents "nutcracker" action due to entry of stones between tread shoes... Self-cleaning drive lugs on alternate tread shoes allow ball-and-socket action of rollers for smooth going and uniform loading along crawler length on rough ground... Crawler drive has oversize clutches and brakes for long life and precise control in any situation... High operator's platform gives the full visibility necessary to maneuver in tight spots. (Get the full story of the MultiFoote DuoMix from your MultiFoote Dealer—or write us for the DuoMix 34-E Bulletin.

Section of DuoMix crawler tread and roller, showing how ball-and-socket action keeps uniform load along crawler length on rough ground. Note single, self-cleaning drive lugs on alternate sides of successive tread plates.



MULTIFOOTE DUOMIX PAVERS

THE FOOTE COMPANY, INC.
1916 State Street Nunda, New York



Color Scheme Aids**Proper Lubrication**

The Alemite lubrication plan called Coloroute is detailed in a 16-page brochure issued by the Alemite Division of Stewart-Warner. Copies of the booklet, Form 22-124, can be secured from the firm at 1826 No. Diversey Parkway, Chicago, Ill., on mention of this notice.

Coloroute uses a system of color symbols to control the selection, handling, and application of all oils and greases, whether it be in the depot, shop, or on the construction project. It has been devised to defeat the condition known as "lubri-chaos", which means lubri-

cant-identification troubles, divided lubrication responsibility, over-lubrication of bearings, application of the wrong grease or oil, and generally slipshod routine. Alemite says that if the oiler, experienced or inexperienced, follows the color route from barrel to bearing, he can't go wrong.

Dealer Holds Open House

In order to acquaint the public with its completely remodeled and modernized plant, at 20th St. and Erie Ave., Philadelphia, the Service Supply Corp. recently held an open house for a group of manufacturers, distributors, and

friends.

The guests were greeted by Harry E. Shaw, President, Carl A. Wahlquist, General Sales Manager, and other personnel of this equipment-distributor firm. The visitors were taken on a tour of the plant where they saw a large modern machine shop, an up-to-date engine-rebuilding shop complete to the latest model of crankshaft grinders, and an equipment-rebuilding shop. Of special interest to the group was a new and elaborately equipped testing room for diesel engines.

On display was a large variety of heavy equipment. This included a new mobile crane built by Service Supply

for the Army and Navy in its shops, and now sold under the trade name of S & L crane. It will be in full production in the near future.

Hydraulic Conveyor Truck

The hydraulic cradle-type conveyor truck recently introduced by the Pioneer Engineering Works is described in a leaflet issued by the firm. The truck has no cranks, winches, cables, or sheaves, but is completely controlled by a hydraulic system. Write Pioneer at 1515 Central Ave., Minneapolis 13, Minn., for further information and for Form 609.

IT'S HERE!...

THE MOST ADVANCED TRACTOR IN ITS POWER CLASS



Allis-Chalmers

HD-5

**NOW! . . . A NEW SMALLER TRACTOR WITH
BIG TRACTOR DESIGN, BALANCE AND STAMINA**

- Engineered Completely New Throughout
- 37.4 Drawbar hp.
- Five Speeds — 1.46 to 5.47 m.p.h.
- Weight: 44-inch Tread 10,750 lbs.
60-inch Tread 11,250 lbs.
- 1,000 Hour Lubrication — Truck Wheels,
Idlers, Support Rollers
- 2-Cycle Diesel Power
- Full Visibility; Comfortable Seat; Readily
Accessible Controls
- Simplified Maintenance
- More Traction, More Ground Contact,
Better Balance

IT'S RUGGED! — IT'S TOUGH! — IT'S DEPENDABLE!

ALLIS-CHALMERS

TRACTOR DIVISION

MILWAUKEE 1, U. S. A.

Diversion Tunnel Is Drilled in Rock

**Will Permit Construction
Next Year of Rolled-Fill
Earth Dam; Flood-Control
Project of U. S. E. D.**

★ WAY up in the green hills of Vermont, muffled explosions have been shaking the ground along the east bank of the Ompompanoosuc River, just north of Union Village. There a tunnel has been bored through rock to divert the water so that a dam can then be constructed across the stream. This is the first step in a project of the U. S. Engineer Department to control floods on the Connecticut River, into which the Ompompanoosuc empties about 4½ miles below the dam site. The U. S. Engineers feel that a rolled-fill earth dam at this point can help to reduce floods, which in the past have menaced such large New England cities further downstream on the Connecticut as Holyoke and Springfield, Mass., and Hartford, Conn.

Work on the diversion tunnel started last spring. The placing of fill for the dam will get under way next year, with the project scheduled for completion in 1948. The general contractor on the job is the Savin Construction Corp. of East Hartford, Conn. The company was awarded the contract on its low bid of \$2,429,208.40, approximately \$500,000 below the engineers' estimate. Bidding on the project was spirited, with three other large contracting firms also seeking the job. Savin in turn sublet the tunnel and shaft excavation to the Stiefel Construction Corp. of Milton, N. Y.

Diversion Tunnel

The gate-controlled outlet tunnel for diverting the river during construction, and for stream control after the dam is built, is 1,170 feet long. Its horseshoe-shaped cross section has an inside diameter of 13 feet. Bored entirely through rock, the tunnel has a reinforced-concrete lining about a foot thick. Midway in the tunnel a 143-foot-deep shaft has been sunk, also through rock, for the control of two gates from the operating house on the side of the hill.

At the top, this gate shaft measures 19 x 26 feet, but increases in size through transitions to 26 x 30 feet as it approaches the tunnel. The tunnel bore is widened at its intersection with the shaft to a width of 32 feet, through transitions upstream and downstream. Concrete is so formed within this widened section as to provide two passages, rectangular in cross section, 7½ feet wide x 12 feet high. Flow through these passages will be controlled by Broome gates, which, together with hoists and other gate accessories, are being fabricated for Savin by Phillips & Davies, Kenton, Ohio. The shaft contains four gate wells, a float-gage well, and an air shaft. The concrete lining is a foot thick in the float well and air shaft, 2 feet thick at the top of the gate wells, and 4 feet thick at the service gates.



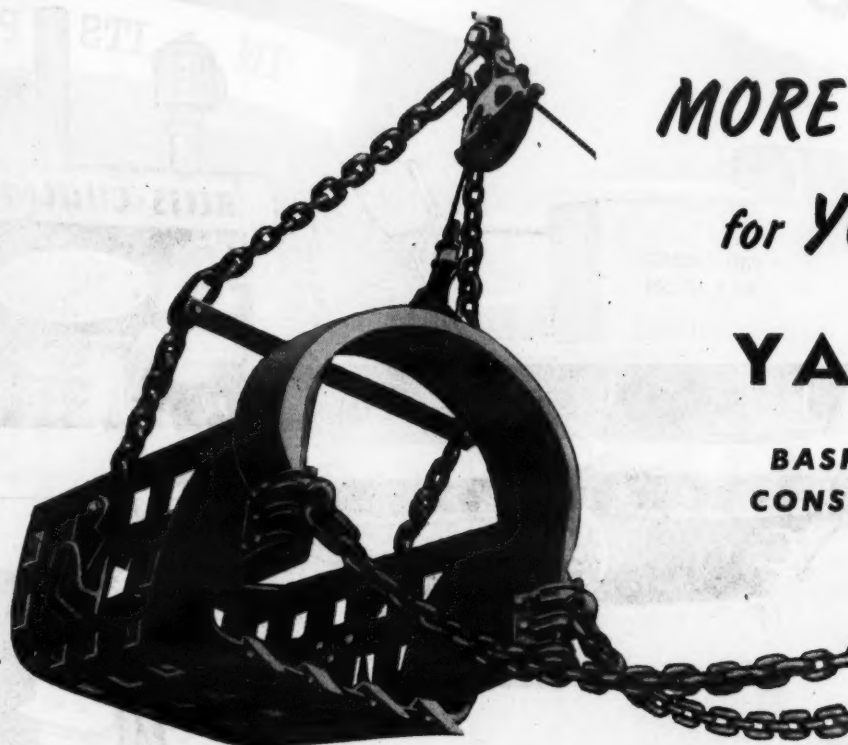
C. & E. M. Photo
Looking towards the south portal of the tunnel from the opposite bank of the river, we see an access road under construction, and Savin Construction Corp. headquarters which appear in the right foreground.

The drilling jumbo was built on a Sterling truck and consisted of a platform 5½ feet off the ground. This supported five 4-inch round steel columns

at the rear end; three of these columns were set vertically on top of the platform while the remaining two were suspended beneath it. The center pipe column on the upper level is 7 feet high while the others are all 5 feet. On each column is mounted a Chicago Pneumatic 60N 3½-inch drifter drill, secured to a horizontal arm on which it can slide back and forth. The arms can also be raised or lowered on the columns to enable drilling at any spot in the face of the tunnel.

With this well designed drill jumbo, rounds of 40 holes were driven at a time over the full heading on a rough 15-foot-diameter line, allowing for an overbreak to about 17 feet. In the drifters was inserted 1¼-inch round lug drill steel beginning with 2½-foot lengths and increasing gradually, usually in 2-foot steps, to a maximum of 13 feet. This maximum length was generally sufficient to blast 12 feet of tunnel at a time. Timken bits used on the drills averaged 6 to 8 feet per bit through the

(Continued on next page)



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C. & E. M. Photo

Pictured here is the south portal of the diversion tunnel for the Union Village Dam flood-control project. The safety sign warns the men that they must wear hard hats in the tunnel.

Diversion Tunnel

(Continued from preceding page)

sericite schist; they started with $2\frac{1}{4}$ and dropped down to $2\frac{1}{8}$, 2, $1\frac{1}{8}$, and $1\frac{1}{4}$ -inch size. To control the dust in this rock work, wet drills were used. Water was applied to the bits through $\frac{1}{4}$ -inch holes in the drill steel. Each drifter had a water as well as an air line feeding to it.

Outside the tunnel a battery of three 500-cfm air compressors, two Worthingtons and an Ingersoll-Rand, pumped air into a receiving tank. This was 12 feet long x 4 feet in diameter; from it, a 4-inch pipe line carried air to the drills. From this same receiver a 2-inch pipe line dropped down to the river to operate a Fairbanks-Morse double-cylinder pump, originally driven by steam but working equally well on compressed air. This pump filled a 350-gallon water tank high up on the hill in 10 minutes. From there the water flowed by gravity to the drills.

Blasting the Rock

As no benching was necessary, drilling was done over the entire heading with the center-cut holes, averaging 8 in number, drilled at an angle only to about a 6-foot depth. The outline of these holes enclosed a wedge-shaped mass of rock which was broken out with an instantaneous blast followed by seven successive delays. Beyond the perimeter of the holes drilled for breaking the cut came the full-depth holes, which were charged with the 2, 3, and 4 delays; the 5 and 6 delays were placed along the top and sides of the outer circumference of the tunnel. Across the bottom of the tunnel the practice was to use about five lifter holes with the seventh or final delay. Thus the center-cut holes were fired first, followed in quick succession by the six different side rounds, and ending with the lifters from the bottom. In this way, the rock was fairly well pulverized over a section 12 feet deep, and there was no need for sledges to reduce the masses of rock to sizes convenient for loading.

The drill holes were loaded with Hercules No. 2 Gelamite which came in $1\frac{1}{4}$ x 8-inch sticks, 50 pounds to the box. For a single blast resulting in a 12-foot advance, an average of 7 boxes or 350 pounds of dynamite was used; to the contractor's gratification, this was only about half what he had figured on. No tamping material was inserted after the dynamite. Each blast yielded 100 cubic yards of rock, which averaged $3\frac{1}{2}$ pounds of dynamite for a yard of rock.

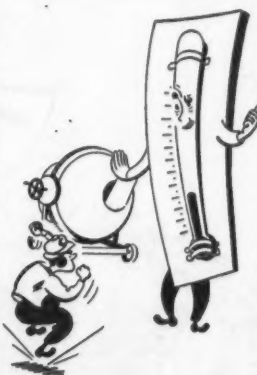
To remove gases formed by the combustion of the dynamite, a Roto-Clone exhaust fan with a 4-foot impeller was set up, back and to one side of the south tunnel portal from which the bore was made. The fan was driven by a G-E 20-hp electric motor through a 3-V-belt

gearing system. From the fan a 16-inch-diameter rubber-treated fabric tubing ran back to the heading supported on steel dowels, strung along the side of the tunnel. A supply of fresh air was furnished to the heading by means of this pipe and blower, forcing powder smoke and foul air to the outside along the tunnel bore. It was unnecessary to use the fan during drilling as the water drills eliminated the dust problem. Furthermore, the battery of compressors furnished an adequate supply of free air through the five drifter drills.

Removing Muck

The rock, or muck as it is generally called, was removed from the tunnel by a Sullivan mucking machine using a $\frac{1}{2}$ -yard dragline bucket. The unit was powered by an air turbine, with air supplied through the same 4-inch line that served the drills. After the blast fumes had been removed from the tunnel, a hole was drilled on each side near the roof as far back as could be reached.

(Continued on next page)



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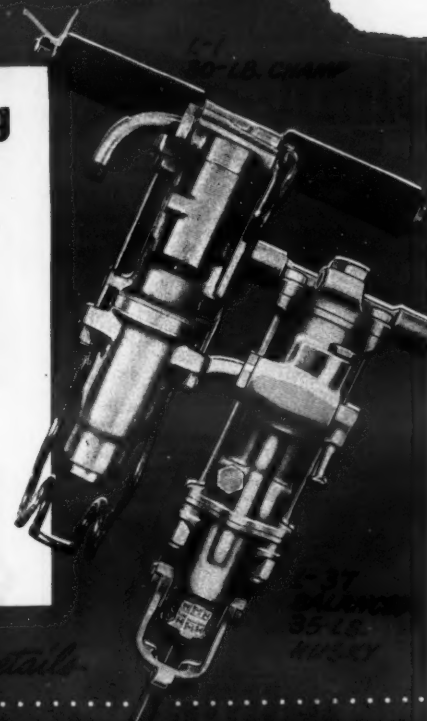
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JOY MANUFACTURING COMPANY

Diversion Tunnel

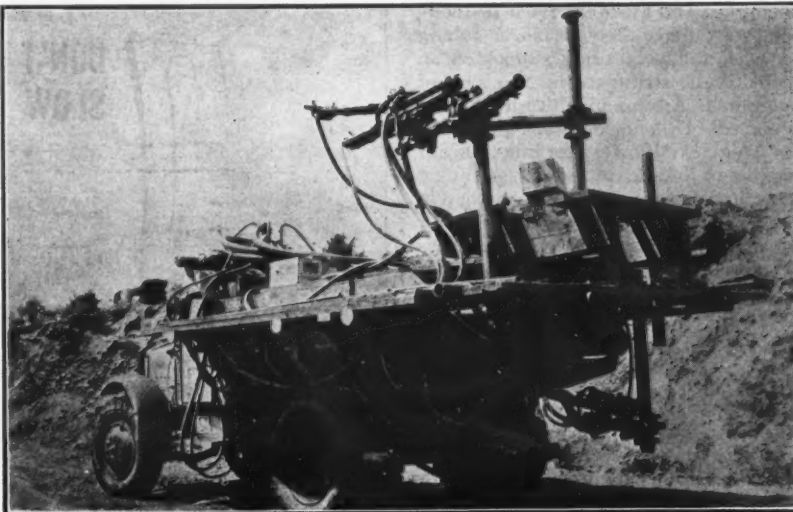
(Continued from preceding page)

Into the hole steel spuds, 18 inches long x 2 inches in diameter, were driven as anchors for the mucking machine. Over each spud a sheave was hooked through which passed an endless cable connected to the dragline bucket and the machine itself. An operator sitting at the heading end of the mucker could sweep the bucket over the entire area ahead, dragging muck back to the machine. Having reached the machine, the bucket was dragged up an inclined apron and onto an open framework track projecting from the rear of the machine. There it was discharged into a Linn Haftrak which fitted neatly underneath.

Two Haftraks with 6-yard bodies hauled from 2½ to 3 yards of muck at a time an average of 1,000 feet from the south portal to a spoil dump. The Haftrak bodies were never filled to capacity because of the limited working space. From the tunnel 12,600 yards of rock were removed; 3,000 yards were removed from the shaft. The general sequence of operations, with drilling, blasting, and mucking in close order, resulted in 12 feet of tunnel per day with a total crew of 20 men working two 8-hour shifts. A single round of explosives was fired each day, with the remainder of the time consumed in preparation for the blast and excavating afterwards.

The exhaust fan was put in use again during the mucking operations. It drew off the fumes from the engines of the Haftraks, and any dust rising from the excavation of the rock. Lights were strung along the sides of the tunnel, with electricity tapped off a pole line running near the job site. A Caterpillar 15-kw generator set was held in reserve. Despite the large amount of water supplied to the drills and the natural seepage in the rocky hillside, the tunnel was fairly well drained because of the 2-foot difference in elevation between its ends. No pumping was required.

At the start of the work from the south portal, the tunnel was braced overhead for a distance of 8 feet into the cut to eliminate the danger of loose rock falling from above the entrance. The bracing consisted of five 5-inch I-beams on 2-foot centers arched over the tunnel roof. These rib braces were



C. & E. M. Photo
Stiefel Construction Corp. used this jumbo drill carriage with five CP drifter drills on its subcontract to excavate the diversion tunnel at Union Village, Vt.

made up of short beam sections bolted together in the shape of a horseshoe, and supporting 3 x 12-inch planking on top running lengthwise with the tunnel.

Some additional shoring extended from the outside rib up to the overhanging rock.

Safety Features

On all U.S.E.D. work safety is always stressed. This job was no exception. A full-time safety engineer was assigned to the project to see that the provisions prescribed in the booklet "Safety Requirements", which is issued by the Safety and Accident Prevention Division of the Office of the Chief of Engineers, were followed. All measures for the safety and physical well-being of the workers were put into effect.

By the use of wet drills in the tunnel, injurious rock-dust hazard was eliminated. Respirators were provided for the use of men working around jackhammers and wagon drills, though they were unpopular with the men, being somewhat cumbersome and uncomfortable. All men in the tunnel or shaft wore hard hats. When a piece of equipment was being lubricated, its engine

(Continued on next page)

How a B-G Travel Plant Gives You Two Advantages

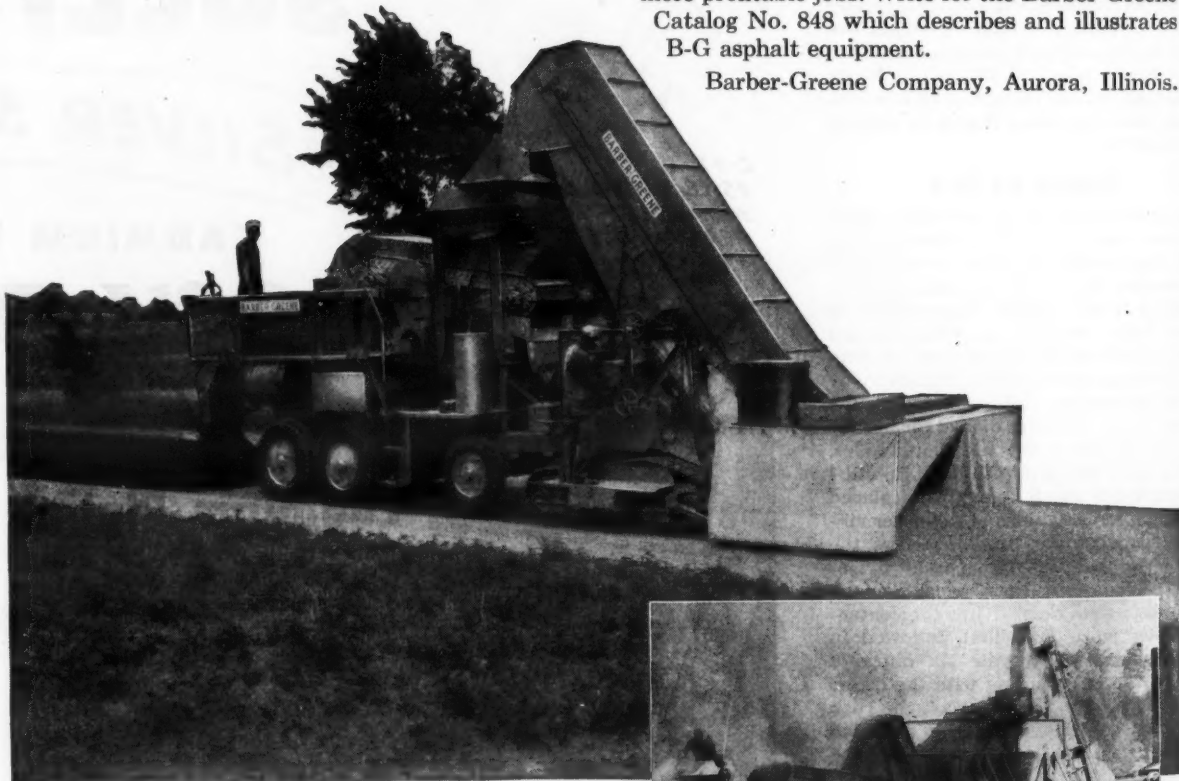
• Low costs per yard and a high quality mix are two advantages enjoyed by the owners of B-G Travel Plants.

The B-G Paving Bucket Loader and Portable Mixer team up to form this high-capacity, portable unit. Its accuracy in proportioning, measuring and mixing means a far better road-mix than is possible with ordinary "on-the-road" units.

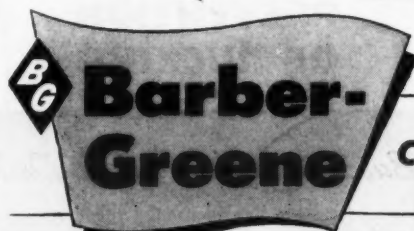
The second important advantage is the fact that with this B-G Travel Plant you can cut your yardage costs through the use of low-cost local materials.

There are many other Barber-Greene constant-flow units for mixing and placing bituminous mix—and for cement and soil stabilization. Like this Barber-Greene Travel Plant they might well help you bid for, and get, more profitable jobs. Write for the Barber-Greene Catalog No. 848 which describes and illustrates B-G asphalt equipment.

Barber-Greene Company, Aurora, Illinois.



• B-G Mixers serve a dual purpose—as part of the Travel Plant or as an integral unit in a Central Plant set-up shown here. Included is the Gradation Control Unit which accurately proportions aggregate for best quality "high-type" mixes.



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Diversion Tunnel

(Continued from preceding page)

could not be idling. When a truck body was raised for greasing or repairs, it had to be shored up immediately. Working machinery was protected by adequate guarding devices if employees had to move around it. A first-aid attendant was available on the project to take care of minor injuries, and the contractor also had to provide an ambulance. Arrangements were made to handle any serious injuries at the nearest hospital which was located in Hanover, N. H., about 10 miles from the dam site.

The job was well posted with safety bulletins. To insure pure drinking water for the workers, a spring was tested by Vermont state health authorities. When this was declared safe, the water was dispensed in covered cans and poured through a spout into individual spiral paper cups.

Dynamite and blasting caps were stored in separate sheds. These were located in a little hollow on top of a hill across the river from where the blasting was being done for the tunnel. The two small houses built in this isolated location had double frame walls built 9 inches apart and filled with sand to make them bulletproof. The roofs of the sheds were also covered with a 9-inch layer of sand.

The full fruits of these precautions should be realized all through the job, and particularly next year when a peak employment of 300 will no doubt be reached.

Work of General Contractor

While the subcontractor was drilling the tunnel and shaft, the prime contractor, the Savin Construction Corp., was also busy. With a force averaging 40 men, it constructed an access road on either side of the river into the rocky hillside. When the dam is completed a pavement will be built on top, linking these two roads together. Work on the access roads started May 1. Shortly afterwards, excavation got under way on the outlet channel below the tunnel, and, later in the season, on the approach channel above the tunnel.

The total length of the access roads is 7,500 feet, and cutting out their 18-foot width in the rock slopes up to the crest of the dam required heavy excavation. Ingersoll-Rand equipment, consisting of two wagon drills, four Jackhammers, and a couple of 315-cfm compressors, was used in the rock cuts which were removed in lifts up to 18 feet, also with Hercules dynamite. A Lorain 1¾-yard shovel loaded both rock and dirt into four Linn Haftraks, two Sterling trucks, and a Mack truck, each unit having a capacity of 6 yards. A Caterpillar D8 tractor-dozzer was also used in the road work.

Materials from access-road excavation, as well as from the intake and outlet channels, if found to be suitable for embankment purposes, were placed directly in access-road fills or stockpiled for future use in the dam embankment. Unsuitable materials were wasted in

spoil areas.

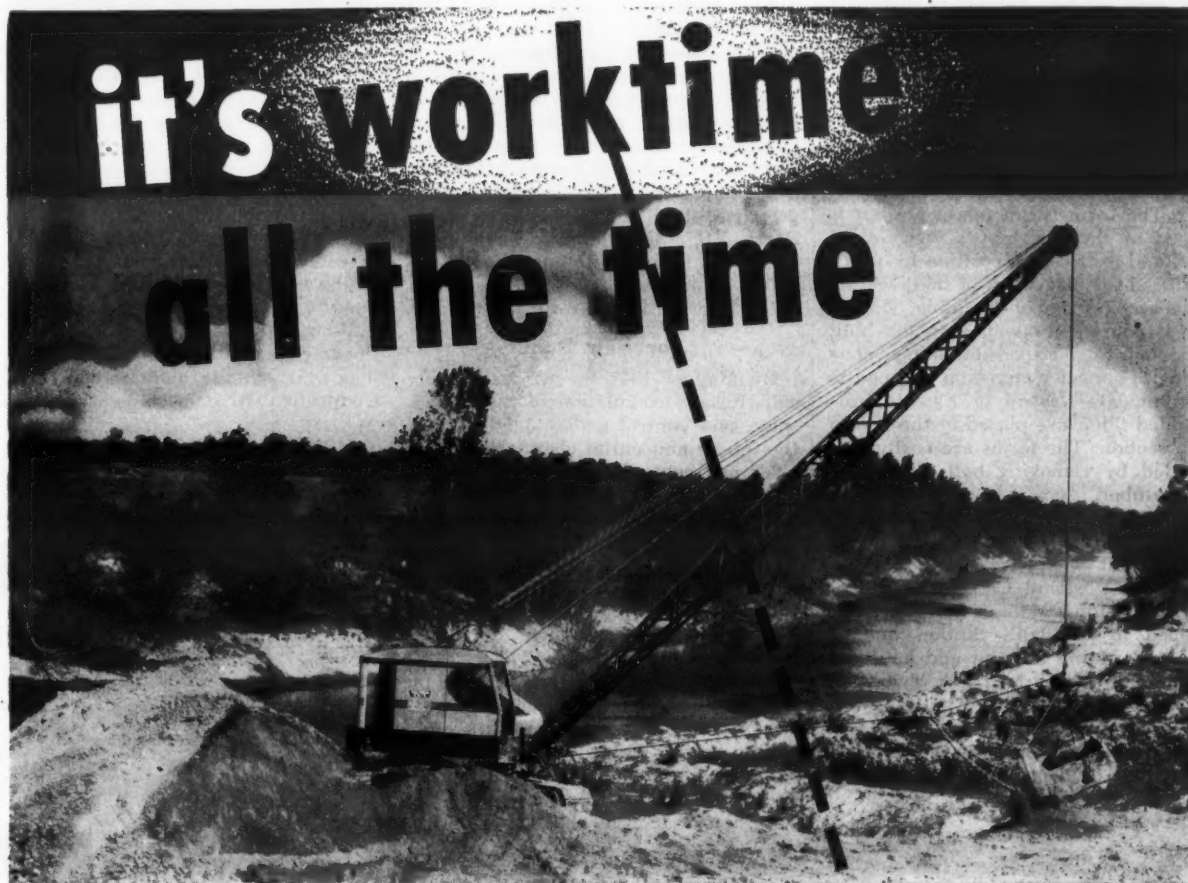
On the west bank of the river below the site, an aggregate-processing plant was set up. It furnished sand and stone for the concrete to be used in lining the tunnel and shaft, and for the construction of the gravity-section concrete weir. By November a Good Roads 12 x

26-inch crusher was grinding out stone, and the rest of the plant, made by the Diamond Iron Works, was also functioning. A Northwest crane with a 40-foot boom and a ¾-yard clamshell bucket was stockpiling the material.

The only crossing to the Ompompanoosuc in this vicinity is an old covered

wooden bridge which was not strong enough for heavy equipment or loads of material. At one location a fording was possible, but one of the contractor's first moves was to build a work bridge south of the tunnel outlet spanning the river on timber bents. The bents con-

(Continued on next page)



FOR "spot" maintenance work in keeping a 500,000-acre former swampland drained for profitable agriculture, Missouri's Little River Drainage District depends on a Bucyrus-Erie ¾-yard 22-B dragline. Kept working and moving 24 hours a day, this 22-B helps keep 900 miles of drainage ditches and three basins clean, 280 miles of levees built up!

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CANADA

Diversion Tunnel

(Continued from preceding page)

sisted of a double row of 12-inch posts, three across, driven into the river bottom and capped with 12 x 12's. Two 36-inch steel girders served as stringers supporting a floor of 6-inch posts, 18 feet wide.

Savin started lining the tunnel with concrete this year. The Lancaster Iron Works built the steel form for the tunnel lining. It is made up of a 3/16-inch skin supported on a 13-foot square framework providing a form 30 feet long. The form is not telescopic but is hinged at the top, moves forward on rails, and is raised in position by jacks. It is used for placement of the concrete in the arch portion of the lining. The invert is poured in advance, in job-built wooden forms. Expansion joints, consisting of copper water-stop crimped to accommodate a strip of Elastite pre-moulded filler, are placed at the end of each section. The forms are easily dismantled by removing bolts along the top member.

Reinforcing steel for the structure came from the Bethlehem Steel Co., and cement was purchased from the Lawrence Portland Cement Co. plant at Thomaston, Maine. Material was shipped to Kendall's Station on the Boston & Maine railroad and hauled 4 miles to the job site by truck. Two 27-E pavers, a MultiFoote and a Ransome, mixed the concrete; one was held as a spare while the other was in action. A Rex 7-inch dual-connection Pumpcrete deposited the concrete in the lining forms.

Maintaining Equipment

While the actual construction of the dam will not start until next year, when the contractor will move in his great fleet of earth-moving equipment from the grading job it is now doing on the Maine Turnpike, preparations for the maintenance of this equipment were laid far in advance. A 30 x 50-foot wooden barn was converted into a shop and stock room and was outfitted gradually as more equipment was moved to the job. Early installations included a DeVilbiss air compressor and a Trojan battery charger, along with the usual workbenches, hand vises, etc. Equipment is greased with Texaco lubricants in Alemite guns, and operated on Esso gas, diesel fuel, and oil trucked in from Barre, Vt., a 45-mile haul. Fueling out on the job is done with a couple of 500-gallon tanks mounted on skids pulled about by the Linn Haftraks.

The New Dam

By May of 1947 the work schedule calls for the completion of the tunnel, shaft, and control gates, together with the intake and outlet channels. On the river just below the intake channel, an upstream diversion cofferdam will be built to elevation 427 which will send the water through the new tunnel. To prevent the water backing up the river and interfering with the construction of the dam, a downstream diversion cofferdam will be built to elevation 420 just above the outlet channel.

Further protection will be afforded by still another cofferdam 400 feet upstream from the center line of the dam. It is to be constructed to elevation 444, or 24 feet above the tunnel invert at the upstream portal, within ten days after diversion of the river. This cofferdam,

which will later be incorporated in the permanent dam structure, is designed to protect the embankment area from damage by high water during the early stages of embankment construction.

During the 1947 season the spillway will be excavated and the dam built up to elevation 560. During the final construction season of 1948, the dam will be completed to a crest elevation of 584. Also, the 388-foot concrete spillway weir will be built to elevation 564, thereby providing a 5-foot freeboard above a maximum spillway surcharge of 15 feet for protection of the dam against overtopping during extremely high floods.

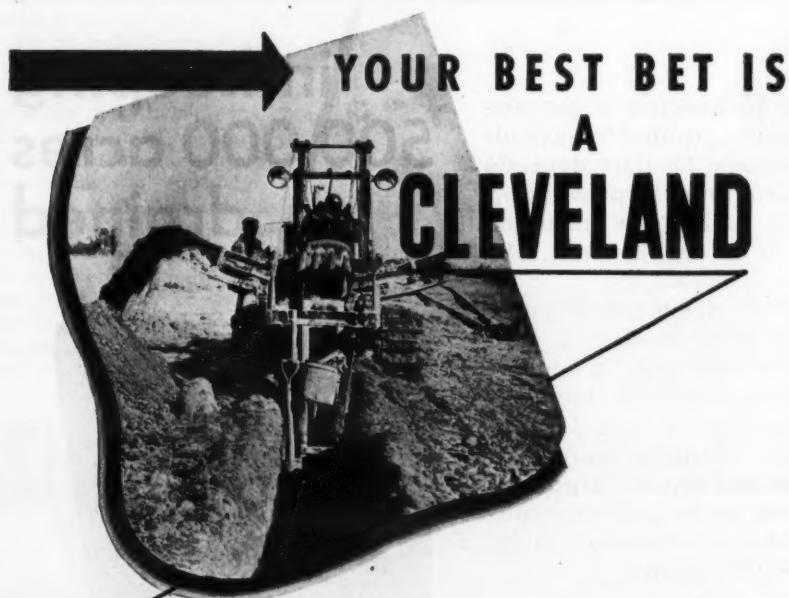
No provisions were entered in this contract for clearing the pool area—a reservoir which will provide 38,000 acre-feet of storage below the elevation of the spillway weir crest. In times of flood, water from the 126-square-mile drainage area will be stored by closing the gates in the tunnel until recession of floodwater in the main stream of the Connecticut River permits safe release.

During periods of normal flow, the river will follow its present channel through the reservoir area unimpeded, by-passing the dam through the tunnel.

The new rolled-fill earth dam will be 1,100 feet long and 170 feet high above the bed of the river. Its total volume will be 1,719,000 cubic yards; this includes 139,000 yards of rock fill and riprap, and the remaining 1,580,000 yards of earth fill, which will be dumped and rolled in place after an average haul of half a mile. The 30-foot crest will be at an elevation of 584 above mean sea level and will carry a 25-foot roadway. At its widest point the dam will measure 1,000 feet along the bottom of its cross section.

It will be located on bedrock into which a cut-off trench will be excavated along the center line. Directly above this will be a core of select impervious material of a silty nature taken from the spillway excavation and built up to elevation 580 for a 10-foot width at the top. The core will have slopes of 1/2 to 1. Surrounding this core will be a layer of

(Concluded on next page)



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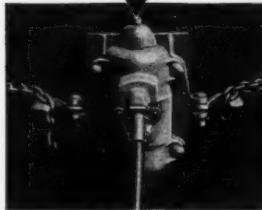
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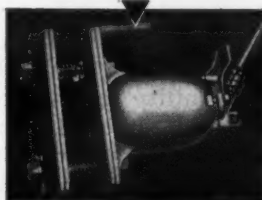
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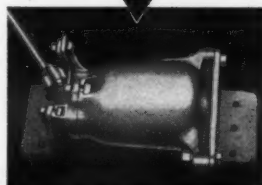
Model PTV-21A. A heavy duty unit for consolidation of concrete in Pipe Forms from 36" to 120" diameter. Model PV-4, a smaller but similar unit is designed for pipe up to 36" diameter.



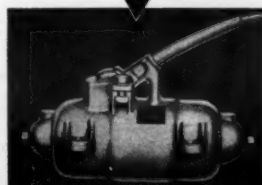
Model FV3-1 designed primarily for form vibration though applicable to many other uses.



The "S" Motor shown with brackets—one of several types of fastenings available for movement of materials applications.



The PT-21A Motor. Similar to the "S" but more powerful. Supplied with desired fastenings for jobs requiring extra heavy vibrations.



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the use of a JACKSON external Vibrator will permit the use of drier, more economical mixes, greatly reduce puddling time, permit earlier stripping of forms and produce stronger concrete with a far higher degree of impermeability. Vibration is transmitted uniformly to form. Quickly attached by means of encircling chain.

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in such concrete construction applications as tunnel linings, or wherever sections are so heavily reinforced that internal vibration is impossible, the Model FV3-1 is literally worth its weight in gold. Quickly clamped to forms, it provides thorough vibration with all the resulting economies and higher quality of work.

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from or to bins, hoppers or chutes is positively facilitated by attachment of a JACKSON external vibrator designed for permanent fastening. Keeps materials in motion, eliminates waste, stoppages and time losses.

TROUBLE-FREE OPERATION

All of the JACKSON external vibrators shown here are built around our "S" type motor and its big brother motor Model PT-21A. They are free from brushes, rings and those small parts usually responsible for trouble. They operate on 110-120 or 220 Volt, 3 phase, 60 Cycle A.C. at approximately 3600 V.P.M. 4800 V.P.M. may be had with use of frequency changers or from JACKSON Power Plants.

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LUDINGTON MICHIGAN

Diversion Tunnel

(Continued from preceding page)

random material built up to elevation 571.5 with a 10-foot bench on each side of the silty center.

Outside of this will be a blanket of pervious material, in this case sand, topped by a layer of gravel 2 feet thick on the upstream side, 1 foot thick above elevation 450 on the downstream side, and 2 feet thick below elevation 450 on the downstream side. This pervious blanket will also extend about halfway under the random section forming a pervious underdrain. Rock riprap will be dumped along both faces of the dam to a thickness of 4 feet over most of the slope, with increased thickness at the toes. The finished slopes to the spillway

height of elevation 564 will be 3 to 1, while the rest of the way to the top they will be 2½ to 1.

The impervious core will permit the passage of only a very small amount of seepage. This seepage, after leaving the impervious core, will enter more pervious material. The line of saturation through the dam will therefore drop sharply immediately downstream of the core, and eliminate any possibility of seepage emergence or loss of stability at the downstream face. The pervious underdrains will be particularly effective in this respect. The pervious shell and underdrain in the upstream portion of the dam will act to maintain stability by providing rapid and effective drainage of the structure at times of rapid draw-down of the pool.

Quantities and Personnel

The major quantities included in this Union Village Dam flood-control project are as follows:

Rolled embankment	1,520,000 cu. yds.
Rock excavation, open cut	153,000 cu. yds.
Rock excavation, tunnel and shaft	15,600 cu. yds.
Common excavation, including borrow	2,255,000 cu. yds.
Concrete	22,000 cu. yds.
Reinforcing steel	531,000 lbs.

The Vermont State Highway Department is designing the relocation of the existing road, which follows the right bank of the river through the work area and leads to communities beyond the upper end of the reservoir area. Construction will be done by Government contract under U.S.E.D. supervision.

The Stiefel Construction Corp., which did the tunnel and shaft excavation, had J. H. Foster for its Superintendent. The

Savin Construction Corp. is represented by Superintendent Charles P. DeBiasi. For the U. S. Engineer Office, Carl H. Lovejoy is Resident Engineer, and L. C. Blomberg is Safety Engineer. C. J. Murray is Chief of the Operations Division of the New England Division Office of the Corps of Engineers, which is headed by Brig. Gen. Douglas L. Weart, Division Engineer.

Hocker Joins Jahn Co.

H. J. Hocker has been appointed General Plant Manager of the C. R. Jahn Co., Chicago, manufacturer of heavy-duty low-bed trailers. Mr. Hocker has recently returned from duty in the European theater with the Army Engineers.



MODEL O-A31 DIESEL
110 H. P.

*All "Harbormaster" models are shipped as complete Units—ready for instant use on arrival!



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Modern Machines Buck Deep Drifts

**County Solves Problems
By Adequate Preparation,
Efficient Use of Men and
Machines, and Snow Fence**

✦ **HANDICAPPED** in recent years by lack of experienced operators and confronted every winter with high winds that pile drifts up to the tops of telephone poles, E. P. Effertz, Winona County Highway Engineer at Winona, Minn., has his snow-removal problems. But they are not without solution.

Winona County in southeastern Minnesota is bordered on the east for 40 miles by the Mississippi River. To the west, from the precipitous bluffs of the river, is the rolling, foothill-like country known as the Winona Hills. It is picturesque and unrivaled for its rugged scenery, but what is lovely to the traveler is a headache to the highway engineer.

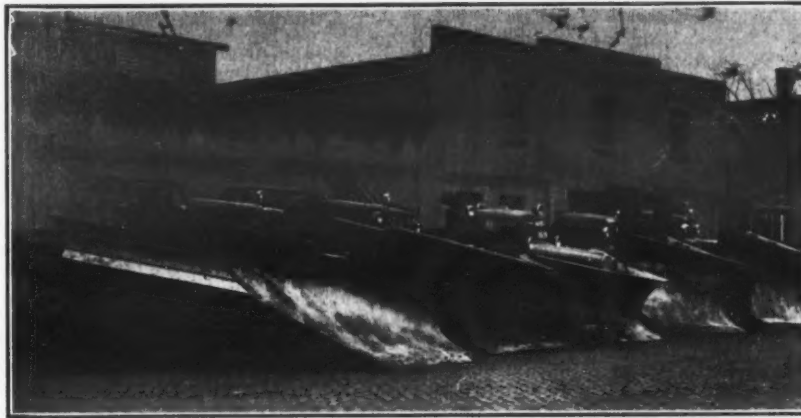
"We try to control drifting on county highways by having backslopes no steeper than 2 to 1," says Mr. Effertz. "But how are you going to establish 2 to 1 as a maximum slope when you are working on a grade so steep that you would have to blast away the whole hill to achieve the standard?"

The county has an annual snowfall of 35 inches, although in two of the past forty years, snowfalls of 58.6 and 64 inches have been recorded. The snow alone would not be so much of a problem. But it is usually accompanied by high winds which pile up deep drifts along the rocky ridges of the Winona Hills.

"However," says Mr. Effertz, a veteran highway engineer of many Minnesota winters, "we have a lot of snow fence and we have some excellent snow-removal equipment. So we generally manage to get most of the roads open before the public starts calling."

A changing public attitude towards snow removal is commented upon by the Winona County Highway Engineer, who recalls a time when blocked roads and periods of winter hibernation for rural residents were accepted as inevitable.

"Now the taxpayer demands and gets



Well in advance of the first snowfall, Winona County prepared for the battle with drifts. Here are five heavy-duty trucks lined up at the county shop in the early autumn, where plows and wings were mounted ready for action.

open roads throughout the county a full twelve months a year," says Mr. Effertz.

County Highway System

The County Highway Department

maintains 369.5 miles of County-Aid and State-Aid highways throughout the winter months at an annual snow-removal cost of approximately \$30,000. In addition to this mileage, the Department also maintains 90 per cent of the 500-

mile township road system in the county.


As far as road surfaces are concerned, highways in Winona County are not difficult to plow. About 80 per cent of the township system is surfaced with crushed rock. The 173.8 miles of State-Aid roads in the county include 104.6 miles of gravel or rock surfacing; 54.5 miles of bituminous-treated surfacing; 10.2 miles of bituminous surfacing; 4 miles of concrete highways; and 1/2 mile of brick roadway.

The 195.7 miles of County-Aid highways consist of 145 miles of aggregate-surfaced roads; 46.8 miles of bituminous-surface-treated highways; 3.2 miles of mixed bituminous surfacing; and 0.7 mile of concrete highway.


Winter Preparations

Preparations for the snow season start in late October or early November with placement of the snow-fence posts, although repair of snow-removal equipment at the county shop is under way


(Concluded on next page)




100 YDS. OF MINUS 1 1/4" STONE per hour ... WITH TWO MEN



Telsmith Heavy Duty Apron Feeder



Telsmith Jaw Breaker



Telsmith Gyrasphere Crusher

• The Telsmith-equipped plant of Courtney & Plummer, contractors and producers, at Neenah, Wis., turns out 100 cu. yds. an hour. Three sizes of crushed stone are made—fines, passing 5/16" sq. screen opening, used for aglime; minus 3/4" chips used for resurfacing material; and minus 1 1/4" used for highway and building construction after preparation in the Courtney & Plummer ready-mixed concrete plant. Sound plant de-

sign plus the exceptional efficiency of Telsmith equipment, enables the plant to operate with only two men. Telsmith equipment includes: 36" x 10' Heavy Duty Apron Feeder; 25" x 36" Roller Bearing Jaw Breaker; 4' x 12' triple deck 2-bearing Vibro-King finishing screen; 36" Gyrasphere Secondary Crusher. Modernizing the old, or building a new plant? Consult Telsmith engineers... get Bulletin Q-34.



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 Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. • Brandeis Machinery & Supply Co., Louisville 8, Ky. • Southern Eqp. & Tractor Co., Monroe, La. • Rish Equipment Co., Charleston 22 & Clarksburg, W. Va.—Roanoke 7 & Richmond 10, Va. • Wilson-Weener-Wilkinson Co., Knoxville 8 & Nashville 6, Tenn.

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KOTAL

Master Mixes

The Advanced All-Weather
Aid in Building Better Roads

Modern-Type Machines Buck Big Snow Drifts

(Continued from preceding page)

all summer. After the posts have been frozen in place, the fence itself is hung. Snow fence is placed in the face of the prevailing wind, on the north and west sides of the highway. This placement is based on years of observation and experience and as a general rule is correct. The County uses 15,500 linear feet of Blizzard Buster metal snow fence, and 142,500 linear feet of slat-type snow fence. Standing corn stubble in adjoining fields has been found to be a real help in controlling drifts and is a valuable supplement to the snow fence.

Other pre-season preparations include stockpiling sand and crushed rock purchased from commercial pits in the county. The stockpiles are treated with 75 pounds of either calcium chloride or common salt per cubic yard and are scattered at convenient locations throughout the county. During the winter, steep grades, of which there are many, and downhill approaches to state trunk highways are sanded. Curves are sanded when ice makes them dangerous.

When a Storm Starts

When snowstorms strike Winona County, snow removal starts as soon as the wind abates. There are six motor graders with operators stationed throughout the county, and these graders, equipped with V-plows and wings, can handle the ordinary falls of snow. Another motor grader stationed at the county shop at Winona works near the city or, if needed, assists the graders in the country. The County's fleet of V-plow and wing-equipped power graders includes: 2 Austin-Western graders with Frink V-plows and 2 with Wausau V-plows; 2 Caterpillar No. 12 graders, one with a Frink V-plow and one with a Wausau V-plow; and 1 Galion grader with a Wausau V-plow.

Bad drifts or extremely heavy snowfalls bring out the heavy-duty four-wheel-drive trucks with V-plows and wings. The County owns five heavy trucks with V-plows, and these units are stationed at the central shop at Winona. Included in the truck line-up are a 10-ton Oshkosh, a 6 to 7-ton Oshkosh, and three Walter 6 to 7-ton trucks. These are equipped with Sargent, Frink, Walter, and Wausau V-plows and wings.

During the war years, Winona County was handicapped by a lack of experienced equipment operators and it was impossible to work at night. With the return of servicemen, Mr. Effertz believes, it will be possible during the snow season to go back to the old schedule of two 12-hour shifts for the motor graders and trucks and three 8-hour shifts for the tractors.

Winona County crews first open the 369.5 miles of County-Aid and State-Aid roads which vary in width from 16 to 26 feet. After these roads are made passable, the graders and trucks return to widen these highways out to the shoulders and to plow the township roads and open farm entrances.

Tractors vs. Drifts

When conditions are at their drifted worst, the trucks and graders are augmented by the County's biggest drift busters, two Caterpillar D8 tractors, one equipped with a Wausau and the other with a Frink V-plow. Although drifts as high as telephone poles do pile up along the ridges, it is not always necessary to use the tractors to break through. Some winters the only action seen by the D8's is widening out the roadway after the grader or truck plows have been through.

This winter, Mr. Effertz believes, it may not be necessary to use the tractors, at least for drift busting. The County has just purchased a Roto Wing rotary-type snow plow which will be mounted on the 10-ton Oshkosh and which is expected to be adequate for the most severe conditions.

Shop and Personnel

The County maintains a complete county highway shop at Winona, in a former brick foundry which has been stuccoed and modernized. Shop equipment is complete and includes a lathe, drill presses, milling machine, and welding outfits. With the exception of ignition and electrical work, all county repairs and maintenance are done at the county shop. Shop personnel includes a foreman, two mechanics, a blacksmith, a welder, and a tire man.

Employment in the Highway Department runs between 50 and 60 men a year. All employment, except for extra wing men during especially bad winters, is on a year-around basis.

Past, Present, and Future Of Road Building Reviewed

Yesterday, today, and tomorrow in the building of America's roads are briefly chronicled in two brochures offered to members of the construction and highway industry by the Caterpillar Tractor Co., Peoria 8, Ill.

Equipment requirements for the current and future road-construction pro-

gram are analyzed in one booklet, "Highways and Byways". Caterpillar and allied lines of equipment feature this brochure, Form 9455.

The humble beginnings of earth-moving machinery now in use are pictured in "Future With a Past", Form 9458. The improvements that have come, the progress born of diesel power, and the outlook for the future are discussed.



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MICHIGAN MODEL TMDT-16 — ½ yd. shovel, 10-ton crane.

Equipped with Timken Tandem dual drive axle.

Total reduction in low gear 72.88-1.

Four Timken-Westinghouse air brakes.

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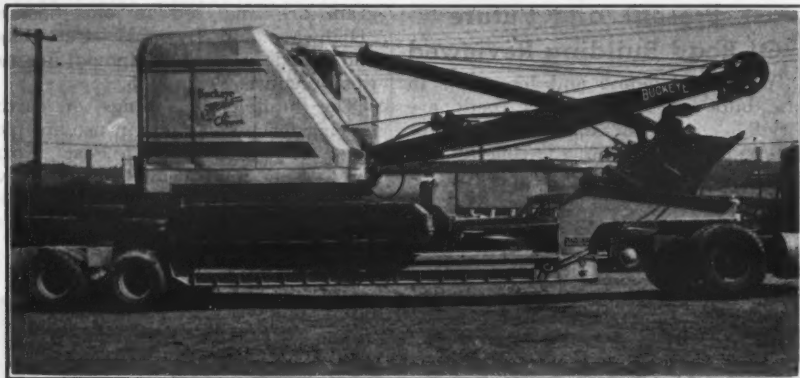
dependable, economical power give you that fast, steady performance that counts . . .

Plan now to put MICHIGANS on your jobs! There's a complete line of ¾ yard and ½ yard shovels, 6 to 12 ton cranes — all fully convertible, all one-man operated. Get the facts — ask for Bulletin CE-126.

MICHIGAN

POWER SHOVEL COMPANY

BENTON HARBOR, MICHIGAN



A Fontaine heavy-duty flat-bed trailer carries a Buckeye shovel.

Flat-Bed Trailers Haul 15 to 60 Tons

A line of flat-bed trailers for hauling construction equipment is now available from the Fontaine Truck Equipment Co., Inc. Their capacities range from 15 to 60 tons. All models can be furnished with straight deck or 6 inch

drop. And all standard models can be slightly modified to suit the needs of the individual purchaser.

The floors are hardwood and run from 1 3/4 to 3 3/4 inches thick, depending on the trailer capacity. On most models axles are of the trunnion type; they oscillate to compensate for uneven road conditions and to equalize the load. Bendix-

Westinghouse 12 1/4 x 5-inch air brakes or vacuum brakes are standard equipment on all models. The 45 and 60-ton-capacity models have sufficient gooseneck length for any tandem-axle tractor, the manufacturer says; other models have sufficient gooseneck length for single-axle tractors.

Further information may be obtained by writing to the company at 3827 First Ave., North, P. O. Drawer 1591, Birmingham 1, Ala., and mentioning this news item.

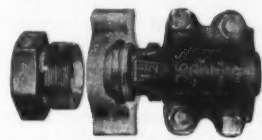
Gravel-Plant Data

A demountable sand and gravel plant for use on sizable construction and paving jobs is detailed in a broadside available from the Link-Belt Co. The plant features standardized sections designed to be disassembled and assembled with ease.

Copies of folder No. 2170 will be sent you on mention of this notice. Write the company at 307 No. Michigan Ave., Chicago 1, Ill.

These Couplings Are Washerless, Leakproof, Safe

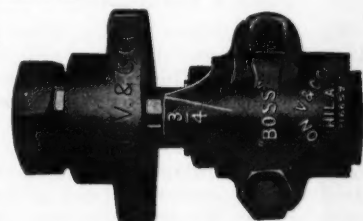
In both of the couplings described below, ground joint construction provides a soft-to-hard metal seal between stem and spud that is washerless, leakproof, trouble-free. Correct design and superior strength eliminate all possibility of blow offs.



"G J-BOSS" GROUND JOINT, STYLE X-34 FEMALE HOSE COUPLING

For all high or low pressure steam, air, water and hydraulic hose. Copper insert in spud fits tight against rounded head of stem to form washerless, leakproof seal. "Boss" Offset and Interlocking Clamps anchor coupling to hose with powerful, all-round grip, without pinching. Sizes, 1/2" to 4", inclusive.

NOTE: For washer type couplings of otherwise identical design, specify "Boss" Washer Type Female Coupling, Style W-16.



"G J-BOSS" Ground Joint AIR HAMMER COUPLING

Incorporating the same washerless, leakproof construction as the Style X-34 coupling described above. No washers to wear out or be replaced. Furnished with strong, tight-gripping "Boss" Interlocking Clamps—no danger of blow-offs. Compact Type, Style XLB-61, 1/2" and 3/4". Heavy Type, Style XHB-72, 3/4" and 1".

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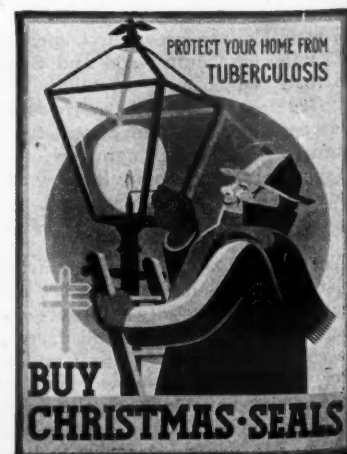
IT'S NOT IN THE CARDS



To equal the all-around
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BUILDERS OF ROAD MACHINERY
Austin Western
SINCE 1859



Cold-Mix Surface Renews Old Road

State Maintenance Crew
Improves 2-Mile Stretch
Of Worn Pavement; Mix
Hauled 33 Miles

IN the western part of New Jersey, a 2-mile stretch of concrete highway nearly a quarter of a century old was improved last summer. This was done by covering it with a cold-mix bituminous surfacing laid to a loose depth of 2 inches and compacted by rolling to 1½ inches. The work was carried out by maintenance forces of the New Jersey State Highway Department in six working days from August 20 to 28. It was part of a general maintenance program to resurface those portions of old concrete roads that have become cracked and bumpy through settlement. This particular stretch of road lies between Bloomsbury and Still Valley on U. S. 22, which is also State Route 28, in rolling country comprising the foothills of the Pohatcong and the Musconetcong mountain ranges.

The old 8-inch concrete slabs, 20 feet wide, had received little patching since the road was constructed in 1922. Because of the hilly terrain, the road is bordered in several locations with 5-foot-wide concrete gutters; these required special attention during the spreading of the cold-mix. No particular preparations were necessary before the spreading. The road surface was free from dust, being in the open country away from industrial regions, and sweeping was dispensed with. Furthermore, as the work was done during the hot summer season, a bituminous tack coat was not required before spreading the mix to bond it to the pavement.

The plant-mix is known in the New Jersey State Highway Department specifications as Type A Top Course. It is a mixture of stone having a temperature of from 35 to 125 degrees F; screenings; lime; asphalt having a temperature of from 250 to 350 degrees F; and liquefier. The State purchased the material from the Barrett Division of the Allied Chemical & Dye Corp., which has a 2-ton asphalt plant at Bound Brook, N. J., on U. S. 22. Here the aggregate

was heated in a drier before being fed to the Cumber plant and pugmill. The gradation of the aggregate fell within the following limits:

Cold-Mix Type A	
Sieve Size	Per Cent Passing
¾-inch	0-7
¾-inch	35-60
No. 4	20-45
No. 10	5-15
No. 30	3-8
No. 80	1-6
No. 200	3-7
Asphalt cement (penetration 85 to 100) 5¼-7	
Liquefier, 2 to 2½ gallons per ton	

A typical 2-ton batch by weights was as follows:

Stone, ¾-inch	2,975 lbs.
Screenings	750 lbs.
Lime	45 lbs.
Asphalt cement	230 lbs.
Total	4,000 lbs.

Spreading the Mix

To haul the 2,580 tons of plant-mix required for this 2-mile job, the Barrett Division engaged the W. L. Trucking Co., Inc., of Scotch Plains, N. J. This company supplied 14 trucks of various makes and with capacities ranging from



C. & E. M. Photo

A Barber-Greene Tamping-Leveling Finisher pushes along an International truck until its 13-ton load of bituminous plant-mix is emptied and spread in a 10-foot lane. This cold-mix resurfacing in New Jersey was done by state maintenance forces.

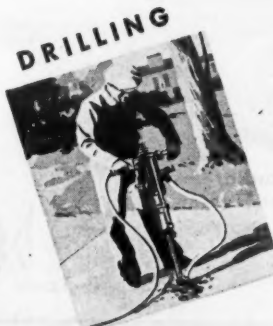
6 to 13 tons. After loading, the contents of the trucks were covered with tar-

paulins so that the mix arrived at the
(Continued on next page)

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*Daily Growing
Greater on
Thousands of Jobs*

Knocking hours off schedule, cutting operating costs—that's what Barco Hammers are doing in every section of the country. Contractors like their speed and economy, workmen like their light weight, easy operation—their efficiency under tough conditions at hard-to-reach spots. And for versatility, Barco has eleven special tool attachments, each instantly interchangeable. Write to Barco Manufacturing Co., Not Inc., 1818 Winnemac Avenue, Chicago 40, Illinois.



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Now available—widely used CATAPHOTE Metal Reflector and plain Signs for all types of traffic-control messages. Long-life, low-cost illumination assured by use of Cataphote Reflector Buttons...for day-and-night effectiveness! No moisture condenses...no yellowing with age...brilliance guaranteed 3 years. Specify Cataphote when ordering from your dealer. Cataphote Corporation, Toledo, Ohio

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For steel signs—front entrance mounted button, 5 sizes.



For wood installations 5 sizes

Cold-Mix Surfacing Renews Old Highway

(Continued from preceding page)

job site with a very slight heat loss from the 110 degrees F at which it left the pugmill. The warmth of August days contributed, of course, to the retention of the heat, despite the long 33-mile haul. In the course of the 8½ to 9-hour work day each truck carried three loads of black-top to the job, as the average time consumed on a one-way trip was 1 hour and 15 minutes. An average of 360 tons or about 42 loads was hauled a day. This supplied enough material for 4,500 square yards of surfacing. The best day, when some of the trucks got in an extra trip, saw 400 tons laid. Actually the maintenance crew could handle 600 tons a day, but additional trucks for hauling were difficult to obtain.

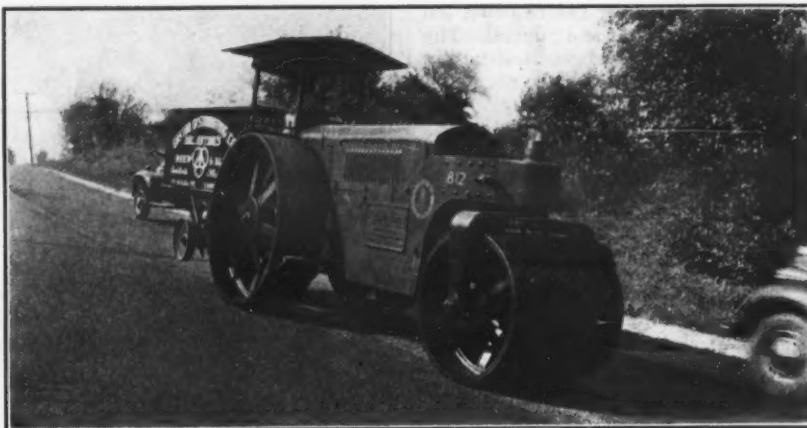
When the trucks reached the job location, the mix was dumped into the hopper of a Barber-Greene Tamping-Leveling Finisher which pushed the trucks slowly along until their contents were completely discharged. The cold-mix was laid in 10-foot lanes at the rate of 150 pounds to the square yard. On curves, however, or when a section which had a bordering concrete gutter was reached, the width of the lane had to be increased. This was accomplished by opening the spreader box on the side towards the shoulder, and permitting the material to spill out in sufficient volume to cover the additional width of pavement. Along the gutter sections the mix was usually raked out 2 feet beyond the edge of the slab on a gentle slope which feathered out to nothing in that distance.

To keep the Finisher on line, particularly when the extra width was added making the paved surface 23 to 24 feet wide, a line was strung between nails driven into every other gutter joint to mark the outside border of the new surface. On the other side, a telltale with dangling chain served to keep the operator aware of his position. The 2-inch loose depth required was constantly checked by the screed operators, one on each side of the machine, by sticking a rod through the mix at regular intervals. This measuring device had a handle at one end and a disk at the other, set back 2 inches from the end; a quick thrust of the rod into the surface could tell if the exact depth was being obtained, or whether the screeds should be raised or lowered because of irregularities in the old pavement. The new surface conformed to the existing 1½-inch center crown in the old road.

Heavy Traffic

The chief problem to contend with on this job was the traffic. U. S. 22, which crosses New Jersey to connect New York and Pennsylvania, is busy at all times, and especially so in the summer months with the additional tourist travel. Traffic naturally had to be maintained, so only one lane was done at a time while one-way traffic was routed over the lane kept open. The usual schedule was to do half the day's work on one lane in the morning, and then to lay the adjoining section of lane in the afternoon. In this manner a constant length of full-width pavement was completed each day. A flagman at each end directed the movement of vehicles to keep traffic flowing continually. But even so it was not uncommon to have lines of 150 to 200 cars backed up in the short space of five minutes.

Following behind the Finisher as the mix was spread came a Galion Chief 10-ton 3-wheel roller, rolling from the center joint out to the edge. The surface was rolled sufficiently to compact the loose 2-inch depth of material to a



C. & E. M. Photo

A Galion Chief 10-ton roller compacts the loose 2-inch depth of cold-mix bituminous surfacing to 1½ inches on U. S. 22 in New Jersey.

firm 1½-inch top course. After one lane was rolled it was opened to traffic while the crew moved over to the adjoining lane. At the end of the day's work, when the rolling was completed,

the full width of the road was available to traffic.

The maintenance force numbered 20 men, including the maintenance foreman and his assistant: 3 on the Finisher

(1 operator and 2 men to make the screed adjustments); a roller operator; 3 truck drivers; and 11 laborers for raking, shoveling, and flagging traffic. The rakes and shovels of those handling the cold-mix were cleaned with kerosene carried along in a wheelbarrow. Some gravel had been placed in the coated aggregate adhering to these hand tools.

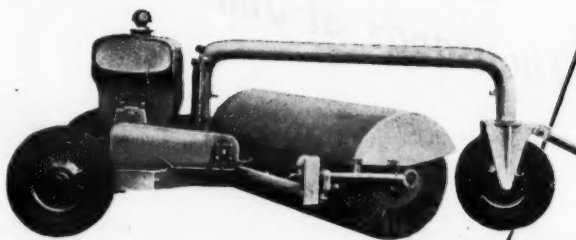
When the resurfacing was completed, the 10-foot shoulders were then raised to meet the new grade of the pavement by surfacing them with stone of sufficient depth to bring them flush with the pavement. The stone was what is known as second-grade ¾-inch. It consisted of ¾-inch stone combined with a sufficient amount of fines to permit of compaction and binding of the material. This stone was purchased from the Trimmer Quarry at Pattenburg, N. J., which delivered it on the job after a 6-mile haul. A Galion power grader then spread the material evenly over the shoulders.

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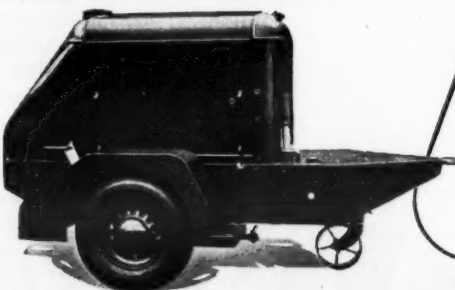
**IT'S NOT WHAT
YOU LIKE TO DO-BUT WHAT YOU DO
THAT COUNTS**



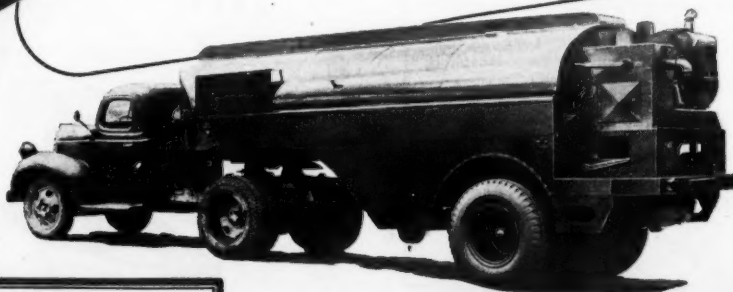
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Supply Tank

When those big Black Top Road, Highway or Airport Runway jobs are ready for Construction or Repair—do you like to do a modern efficient job—or do you do a modern efficient job?

If you have the right Equipment, engineered, tested and proven like Littleford "Spray Master" Pressure Distributors, Road Brooms, "Tankar" Steam Heaters, Supply Tanks, then there's no reason for not doing a perfect Black Top Job.

Let's take a look at these Littleford Units and see why they're efficient and modern. The "Spray Master" with Full Circulating Vacuum Flow Spray Bar circulates the material by Vacuum not pressure. Road Brooms have Hydraulic Tension Control on the Brush for adjusting Brush tension on Road surface. "Tankar" Steam Heater produces steam in two minutes' time. Supply Tanks can be built without the use of a frame—known as Littleford Frameless Constructed tanks. It's what you do that counts and you can count on Littleford Black Top Road Equipment.



LITTLEFORD

LITTLEFORD BROS., Inc.

485 E. PEARL ST.,

CINCINNATI 2, OHIO

Cold-Mix Surfacing

(Continued from preceding page)

Personnel

The maintenance-crew members were picked up in the morning by two state-owned Chevrolet $1\frac{1}{2}$ -ton trucks which brought them to the job. A similar truck carried the tools. Under the direct supervision of L. W. Klockner, Supervisor of the Western Maintenance District, Maintenance Foreman Paul Haney was in charge of the cold-mix surfacing operations for the New Jersey State Highway Department, which is headed by Spencer Miller, Jr., State Highway Commissioner. Alexander W.

Muir is Superintendent of Maintenance, and Kenneth B. Craft is Material Supervisor. Jim Tuozzolo was Inspector at the asphalt plant.

History of Engine Firm

In a new 32-page folder, the Waukesha Motor Co. describes its forty years of engine manufacture. From the small internal-combustion engines of 1906 to the large diesels of 1946, Waukesha presents a parallel to the first forty years of the twentieth century.

At the present time, Waukesha has four sizes of diesels scheduled for early production, with others projected as the

needs develop. The largest is a 1,197-cubic-inch 6-cylinder industrial engine, followed by a 248-cubic-inch tractor and industrial six, and an automotive six of 779-cubic-inch displacement. Later a 134-cubic-inch four, and a 201-cubic-inch industrial six will be put on the market.

The catalog contains pictures of these models, of the factory, of production methods, and of the various uses to which the engines are put, including construction and road-building machinery. It is obtainable by writing to the firm at Waukesha, Wis., and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Shop-Machine Catalog

A new 32-page catalog describing the complete line of metal and wood-working machines made by the Walker-Turner Co., Plainfield, N. J., is available from the manufacturer for the asking. The booklet contains pictures and specifications of all the drill-press models, radial machines, belt and disk surfacers, polishing lathes, grinders, wood lathes, arbor saws, jointers, etc., in the line.

When writing to the manufacturer, kindly mention where you saw this announcement and request a copy of Catalog G-3-3.

ALL-WHEEL-DRIVE CONVERTED FORDS

TOUGH TRUCKS FOR TOUGH JOBS

Marmon-Herrington *All-Wheel-Drive* converted Fords are built for really tough trucking jobs—the kind that are difficult, often impossible, for trucks of conventional drive.

As thoroughly at home off the highway as on, Marmon-Herrington *All-Wheel-Drive* converted Fords stride through deep mud, sand or snow, up steep hills and grades, with amazing speed and ease. Regardless of weather or

terrain, these great sure-footed trucks can be depended on to carry men, materials and equipment—where you want them, when you want them . . . swiftly, safely, surely.

Investigate the truly great advantages of Marmon-Herrington *All-Wheel-Drive* Trucks—the big Heavy-Duty models as well as the Ford conversions. See your near-by Marmon-Herrington dealer, or write the factory direct.

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This Marmon-Herrington ALL-WHEEL-DRIVE converted Ford truck easily handles peak pay-loads in the toughest kind of going. Ideally suited for all types of construction, maintenance and transport work—on the highway or off.



Two Dual Highways Improved This Year

Sections of U.S. 13 and 40 Widened and Resurfaced With Concrete and Hot-Mix By Same Contractor

† TWO heavily traveled sections of dual highway in northern Delaware were improved this year when stretches of U. S. 40 and U. S. 13 were widened and resurfaced south of the point where they come together about 10 miles below Wilmington. Two separate contracts for the work were awarded to the Wilson Contracting Co. of New Castle, Del., which conducted the two operations simultaneously. In each case the final result achieved was the same—a stronger, wider, and consequently safer road. But as the road conditions were dissimilar, the plans of the Delaware State Highway Department differed as to the type of work performed under each contract.

U. S. 40 Job

The two lanes of traffic on U. S. 40 are separated by a depressed center parkway strip about 50 feet wide. This was added in 1934-1936 construction when the northbound pavement was laid. The original road, now used for southbound traffic, was built 23 years ago of non-reinforced concrete with 6-8-6-inch section 16 feet wide. In 1930 a 4-foot widening strip of 8-inch plain concrete was added, making a 20-foot pavement. Today this is considered inadequate for the high-speed traffic of the wider vehicles now using this important route between Wilmington and Baltimore. The newer northbound

lane is still in good shape and required in this contract only 950 square yards of patching. The southbound lane, however, was beyond the patching stage. Highway officials decided to have a 2-mile section removed entirely and replaced with a 9-inch concrete pavement 24 feet wide, on a sub-base of selected material 12 inches deep. By extending this sub-base material a foot beyond the pavement on each side, the concrete slab was given firm support for its full width.

The Wilson Contracting Co. arranged a subcontract with Joseph Ward of Wilmington, Del., to break up and remove the old pavement and to place the selected borrow for the sub-base. The subcontractor fitted out a P&H ¾-yard shovel with two 1,700-pound steel weights. These were suspended from the ends of a 4-foot horizontal bar which was lifted to the top of the shovel boom by a ¾-inch cable hoist. When they were released these twin weights did a good job of shattering the old pavement. Another P&H ¾-yard shovel then loaded the rubble to a fleet of four Ford 1½-ton trucks which dumped it in an abandoned borrow pit about 3 miles from the job.

After the concrete was removed, the shovel skimmed off a foot of dirt below. This was hauled an average of 2 miles to fill in an area which will be a future site for a new State Highway Department maintenance shop. The selected borrow for the pavement foundation was obtained from a gravel pit 4 miles from the job. It was spread in two 6-inch layers, with each lift thoroughly compacted by a sheepfoot roller.



C. & E. M. Photo

An Allis-Chalmers AD power grader, with its 12-foot blade set at a 45-degree angle, digs a 6-foot widening trench on U. S. 13 in Delaware.

The concrete pavement was then laid in two 12-foot lanes, with a butt joint along the longitudinal center strip tied together with a ½-inch tie bar 5 feet long and placed at half the slab depth on 5-foot centers. Reinforcing consisted

of No. 4 gage wire fabricated in a 6 x 12-inch mesh pattern and placed 2 inches below the top of the concrete. The pavement contains no expansion joints but has a contraction joint every (Continued on next page)



Daytime Visibility for Nighttime Jobs!

● Lighting worries on compressor operations are banished for contractors whose equipment includes one or more WITTE Dieselectric Plants. Compactly built, they are easily mounted on skids; deliver the light where you want it. Full Diesels, they start and operate on same low-cost, non-explosive fuel as your Diesel compressor engine.

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Now in mass production, providing new savings on initial purchase price, there's a size and type of WITTE Dieselectric Plant that meets your special needs. Safe for operation in confined places, they are sturdily built for uninterrupted performance under the most rugged conditions. See how WITTE Dieselectric can help you maintain your working schedules day and night, and keep on making money for you years after returning its cost. Sizes 3 to 10 KVA. Write today for descriptive literature.



WITTE ENGINE WORKS

DIVISION OF OIL WELL SUPPLY COMPANY UNITED STATES STEEL CORPORATION SUBSIDIARY
LARGEST BUILDER OF SMALL DIESELS KANSAS CITY 3, MO. U.S.A. CABLE WITTEKCMO

A NEW WICO Magneto: XHG...



...for tough, continuous jobs

Tractors, construction equipment, pumps, inboard motors and other small power units with high compression can now be equipped with the dependable high-output ignition supplied by WICO's 1947 XHG magneto. This geared, horizontally-mounted model is available for two, four and six cylinder engines.

The four cylinder model, illustrated above, will succeed the model C. This new magneto weighs a pound less because of its one piece cast aluminum housing and flange, and is ¾" shorter. There are two less bakelite parts, thus lessening the possibility of breakage. Use of a large oilite bushing

and a ball bearing guarantee longer life.

Designed by the largest and most experienced manufacturer of magnetos exclusively, this entirely new magneto is the best buy where high output is required for small engines with high compression.

WICO has complete facilities for the design and manufacture of all types of magnetos and maintains an experienced field service organization. For further information write to the Wico Electric Company, West Springfield, Massachusetts.



Two Dual Highways Improved This Year

(Continued from preceding page)

90 feet. It consists of a 2-inch-deep slit, $\frac{3}{8}$ inch wide, without dowels. At the end of a day's pour a construction joint was made by embedding $\frac{3}{4}$ x 12-inch dowels on 12-inch centers across the pavement at half the slab depth. The pavement has a center crown with a pitch of 2 inches in 12 feet, and is flanked by a 10-foot outside shoulder. On the parkway side an 8-foot strip is topsoiled and seeded.

Major Items

This contract totaling \$131,768.50 was started May 7 and was finished by September 30. It included the following major items:

Excavation	11,500 cu. yds.
Removing existing pavement	24,000 sq. yds.
Selected borrow	16,650 cu. yds.
Concrete pavement	7,000 cu. yds.
Wire-mesh reinforcement	236,000 sq. ft.
Patching	950 sq. yds.

During the construction, 2-way traffic was maintained on the northbound roadway.

U. S. 13 Contract

The contract for the improvement of U. S. 13 was also centered on the southbound lane for the most part. For 2 miles, a 4-foot strip of 8-inch plain concrete was added to the outside edge in order to increase the width of the original 6-8-6-inch concrete from 18 to 22 feet. The limits of the contract were 3.7 miles. But no widening was required on the upper 1.7-mile stretch where the parkway is gradually eliminated to permit the juncture of U. S. 13 and 40. Wherever necessary, patching was done over the entire contract. This was followed by the spreading of 3 inches of hot-mix bituminous concrete over both the original pavement and the widening strip. On the lower 2 miles both directions of traffic used the northbound roadway while construction was in progress on the southbound lane. The center parkway provided a wide barrier between the work and the steady stream of vehicles. On the upper end of the job near the intersection, traffic was maintained by flagmen. In order to cause the traveling public the minimum of inconvenience from the construction, and also to assist the contractor as much as possible in solving the traffic problem, the Highway Department worked out a series of thirty construction steps for the contractor to follow for both the concrete and black-top operations. By adhering to this carefully-worked-out plan, the contractor benefited himself as well as the public.

For the widening strip a 6-foot trench, 8 inches deep, was excavated on the outside edge of the pavement by an Allis-Chalmers Model AD power grader with its 12-foot blade set at a 45-degree angle. Usually six passes of the grader were necessary before the neat outline of the cut was achieved. Heltzel steel road forms, of which there were 4,000 linear feet on the job, were then set to proper line and grade with 12-inch yellow-painted form pins holding them in position. Ordinarily 18-inch pins are used for that purpose; but there is an important conduit running just below the surface of the ground, so the utility company supplied the contractor with 12-inch pins painted yellow for easy identification. The smaller pins prevented contact with the underground conduit.

With the forms in place, the exact depth to the subgrade was obtained by pulling a subgrade board along the trench. It was towed by an International Farmall rubber-tired tractor with one rear wheel riding in the trench and the others on the pavement. The excavated material from the trench that

was not required in building out the 8-foot shoulder was picked up by an Athey Force-Feed Loader, dumped into trucks, and placed along the fill sections.

Paving

Dry batches for the concrete widening were purchased from the Newport Paving Supply Co., Inc., of New Port, Del., about a 7-mile haul from the job, and transported in trucks, up to ten in number, holding two batches each. Water for the mix was pumped from a creek on U. S. 40, not far from the intersection of the two main highways, by a small electric pump. It was stored in a 1,700-gallon tank erected on top of a wooden trestle bent. After being filled from this tank by gravity, a Ford 1,000-gallon tank truck carried the water to a Rex 27-E paver with a 25-foot boom. The paver pulled along on the concrete a 1,000-gallon tank trailer which was filled by transferring the water from the tank truck by a Jaeger 2-inch pump. The paver mixed concrete both for the

(Concluded on next page)

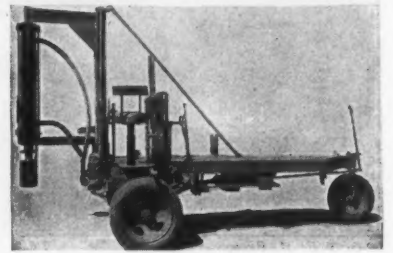
Junior CONCRETE RAPID PAVEMENT BREAKER

Fastest Pneumatic Method

Cuts Cost and Time

Works Inside or Out

Good for all Small Jobs



Let about our HEAVY-DUTY TYPE RAPID PAVEMENT BREAKER CO. 1517 Santa Fe Avenue, Los Angeles 21, Calif.

HEAT ... where you want it with the HERMAN NELSON Self-Powered HEATER

can be used for:

SPACE HEATING of temporary buildings, storage sheds, repair shops, buildings under construction.

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Keep Men on the Job in Coldest Weather . . . Cut Winter "Waiting Time"

★ Enough Heat for Three Ordinary 5-Room Houses

★ No Smoke . . . No Soot . . . No Open Fire

★ Easy to Move From Place to Place

You'll be practically independent of winter's severest cold on any construction job with the HERMAN NELSON SELF-POWERED HEATER. Jobs go ahead faster, men are able to work better . . . it's easier to fill contracts on time by using this versatile source of heat.

There's quick heat . . . where you want it . . . with this portable self-contained heating unit. Burns gasoline by a new, safe method — requires little attention. Easily handled by one man.



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MOLINE, ILLINOIS



C. & E. M. Photo

The Wilson Contracting Co. used this International Farmall tractor to tow a sub-grade board along the widening trench to obtain exact depth.

Two Dual Highways Improved This Year

(Continued from preceding page)

widening and the patching. Calcium chloride was added at the paver for purposes of curing, with further help from wet burlap after the pour. A Blaw-Knox double-screed finishing machine driven by a Le Roi gas engine imparted a smooth surface to the widening-strip concrete.

With the widening and patching completed, 3 inches of bituminous concrete was then spread over the concrete base in two courses, a 1 3/4-inch base and a 1 1/4-inch top, by a Barber-Greene and an Adnun Black Top Paver. The material was purchased from the same company that supplied the concrete batches and was delivered to the job in ten trucks holding 8 tons each. Each course was thoroughly rolled by two Buffalo-Springfield 10-ton tandem rollers, with special attention given to the curves which were superelevated when over 2 degrees.

Items and Personnel

This contract, amounting to \$124,645.00, got under way early in April and was completed by the end of September. The principal items included:

Excavation	5,200 cu. yds.
Bituminous concrete	11,600 tons
Concrete base	1,490 cu. yds.
Patching	1,200 sq. yds.
Selected material	3,200 cu. yds.
Concrete pipe, 12 to 36-inch	1,500 lin. ft.

H. P. Wilson of the Wilson Contracting Co. acted as his own Superintendent on both jobs. For the Delaware State Highway Department, D. Pileggi was Inspector on the U. S. 40 contract and V. Lewis Blake on the U. S. 13 improvement. The Department is headed by W. W. Mack, Chief Engineer, with W. B. McKendrick, Jr., and W. A. McWilliams as Assistant Chief Engineers. E. C. Reynolds is Division Engineer for the territory in which both jobs are located.

Highway Department Trains CE Students

In order to give students practical experience in highway design, the Kentucky Department of Highways has added eighteen junior and senior students of civil engineering to its staff, in the Division of Design. The students, mostly ex-GI's, are enrolled in the College of Engineering of the University of Kentucky. Their department work hours will be from 4:00 p.m. to 7:00 p.m. each day.

Arrangements were made through collaboration of Dean D. V. Terrill of the College of Engineering and D. H. Bray, Director, Division of Design. The men will receive hourly wages based upon the time they are to work. They will be under the direction of a regular senior engineer from the Division.

Besides seeking "to augment our manpower, we hope to interest these

engineering students in becoming a part of our department", said J. Stephen Watkins, Commissioner of Highways. "With the advance of highway transportation, more and more roads and bridges will be necessary. The Depart-

ment of Highways will be forced to have a greater staff of trained men to take care of the problems of construction and maintenance which must increase with the increase of highway use".

Manual Covers Design In Structural Welding

The growing importance of welding in the erection of steel structures has been marked by the publication of a new book, "Manual of Design for Arc Welded Steel Structures". Compiled by LeMotte Grover, M., Am. Soc. C. E., the 300-page work is said to be the first of its kind.

It contains much information pertinent to the fundamentals of design, materials, inspection, estimating, and engineering control of welding and related operations. Electrode requirements, specifications for welded connections for all sizes of rolled beams, and a series of diagrams for the rapid design of welded connections are included.

The manual is based largely upon

standards set up by the American Welding Society and the American Institute of Steel Construction, and upon reports of the Welding Research Council of the Engineering Foundation. It is available from the Air Reduction Sales Co., Dept. MD, 60 E. 42nd St., New York 17, N. Y. Price: \$2.

Block and Tackle Line

A new line of blocks and tackle, made by the Jaques Power Saw Co., is described in a 4-page bulletin. They are claimed to be light in weight and fast to handle and use. Cables can be threaded right on the job, requiring no tools. The line consists of hooks of different sizes; eye bands to make splices and sling blocks; double blocks; and single blocks, with or without a swivel hook. These blocks and tackle can be racked instantly without unscrewing nuts from bolts, etc.

To obtain this broadside, write to the company at P. O. Box 695, Highway 75, Denison, Texas.



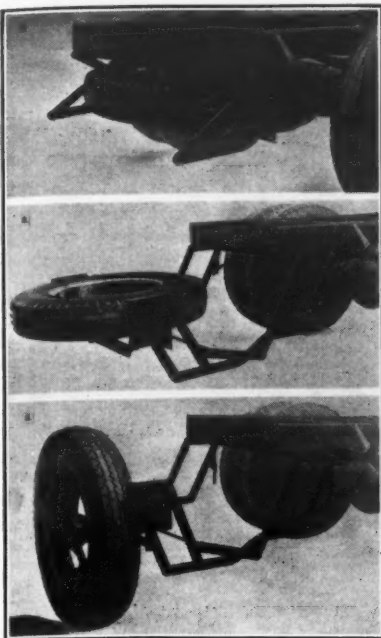
"After all Mister

... you didn't have to take the hard way to discover whether HUBER ROAD ROLLERS are husky machines built to take a lot of punishment. Every HUBER ROLLER owner would confirm this as well as enthusiastically tell you about Huber's quick and easy hydraulic steering — ample speed and power—short wheel base for real maneuverability—simplified design—minimum maintenance—unusual economy."

THE **HUBER** MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER

3 Wheel • Tandem
ROAD ROLLERS
and
MAINTAINERS



Three positions of the Ted Tire Carrier are shown here: clamped under the truck chassis, extended, and tilted so the tire can be rolled away.

Carrier Simplifies Truck-Tire Changing

Changing tires on heavy trucks is often a difficult task, due to the weight of the spare tire and the trouble one man has in removing it from its cradle.

A western inventor has devised a carrier cradle which can be pulled out and away from the truck body to a position where the tire is clear. The tire can then be tilted upright while still attached to the carrier, detached and rolled to the wheel requiring replacement. It's all a one-man job, the manufacturer says.

Bolted or welded to the chassis frame, the carrier holds either disk wheels or demountable rims. It comes in three sizes: Model A carries tires up to and including 8.25 x 20, Model A-9 carries 9.00 x 20, Model B carries tires from 10.00 x 20 to and including 11.00 x 22.

You can get all the facts about the Ted Tire Carrier by writing the T. E. D. Corp., 928 So. Flower St., Los Angeles 15, Calif., and mentioning this notice.

War-Surplus Engines Unsuitable for All Uses

Prospective buyers of war-surplus engines should consult established distributors of the manufacturer of those engines for helpful suggestions and pertinent information about the possibility of converting them to peacetime use, according to the McClung-Logan Equipment Co. diesel-engine distributor at Baltimore, Md.

Both gasoline and diesel engines manufactured and fitted strictly for wartime uses are being offered to buyers today as "ideal for commercial use", "built for long life, dependable service, and economic operation", etc. Although many diesel engines were built to meet military requirements, the most important of which was dependability, many of these surplus engines are not ideal for commercial use in their present form, says the company.

In fact, it would require a great deal of conversion to make them so for most applications. Furthermore, most diesel and gasoline engines manufactured during the war were built and adjusted to the highest possible power output; whereas in taking the most horsepower out of an engine, long life frequently must be sacrificed.

"We can understand the desire to purchase engines as cheaply as possible", says J. H. McClung, Jr., President of McClung-Logan Equipment Co. "We do hope, however, that the parties interested in surplus engines will consult their local distributors of the engines in question before making purchases of

such equipment. By doing so, they will obtain invaluable advice concerning a given conversion to a particular installation; the advice may save them considerable grief later on. To put it bluntly, they should know what they are up against in connection with the conversion of such material to their uses so that they may proceed with their eyes open."

Lubricating Equipment

An extensive line of lubricating equipment for the construction industry, and for use in garages, shops, and depots, is presented by the Gray Co. in a recently issued catalog.

Lubrication devices for machinery, grease and oil guns and mobile lubricating equipment, barrel pumps, and many lubricating accessories appear in the 34-page illustrated booklet.

You can secure your copy by writing the Gray Co., 60 Eleventh Ave., N.E., Minneapolis 13, Minn., and saying you saw this news item.

CON-VAY-IT 12-20 CONCRETE SPECIAL

pours 2 yards of
WET CONCRETE
in only 3 minutes

Photo shows two American Conveyors in tandem doing this remarkable job for the A. V. Stackhouse Company, Contractors, of Indianapolis, Ind. Contract covered an addition to the Indianapolis Paper Container Co. where concrete was conveyed 35 ft. from truck to pouring point, with an elevation of 22 ft.



Mail this coupon TODAY — Learn how
YOU can SAVE TIME and MONEY
on your concrete handling

AMERICAN CONVEYOR COMPANY
1115 W. Adams St., Chicago 7, Ill.

I am interested in your CON-VAY-IT 12-20 CONCRETE SPECIAL. Please send me full information on this machine.

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AMERICAN CONVEYOR CO.
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HOW MUCH DOES A BLIZZARD COST?



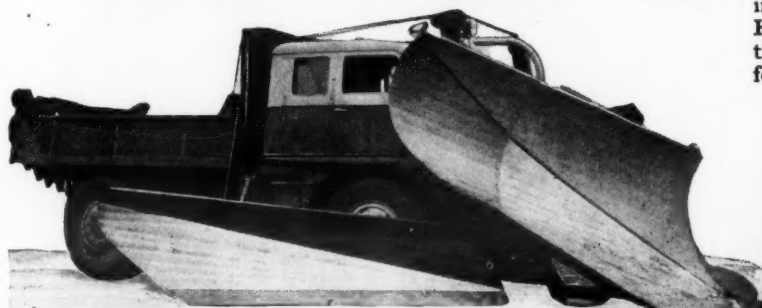
THE REAL COST of a blizzard to your community is *not* the outlay for snow clearance. It's the incalculable losses to taxpayers due to traffic tieups—work stoppages—disrupted supplies—food shortages—health hazards—and general hardships and inconveniences. The longer the paralysis, the higher the cost.

Against this toll, the investment for the most modern, powerful, specialized snow removal equipment is low indeed. Ask any community protected by Walter Snow Fighters! They'll tell

you that Walter Snow Fighters bring blizzards under control faster than any other equipment—remove a greater volume of snow—handle any drift conditions—do a cleaner, more thorough job.

As a result, you save all around. Fewer Walter Snow Fighters are required to do a better, faster job. Your snow clearance expenditure per storm is lower. Your community disruption is held to a minimum.

For over 25 years, Walter Snow Fighters have proved the soundest winter safety and economic insurance a community can have. Have one of our distributors outline the many reasons why. Or, write us for descriptive literature.



WALTER MOTOR TRUCK CO. 1001-19 Irving Ave.
Ridgewood 27, Queens, L. I., N. Y.

**WALTER
SNOW FIGHTERS**

University to Study Truck, Highway Design

A 5-year research project to promote safe, economic, and efficient highway transportation has entered its initial phase during the current school year at the University of Wisconsin College of Engineering. The project is supported by a grant accepted in 1945 from The Four Wheel Drive Auto Co. It is under the direction of Archie H. Easton.

The primary objectives of the research project are: to make basic studies of truck and highway design considering safety, economy, and efficiency; to compare four-wheel-drive trucks with single-axle-drive trucks through experimental tests; to provide advanced study in the fundamentals and techniques of truck and highway design; and to make other miscellaneous studies.

Continuous investigations have been conducted for several years by Herman V. Larsen, FWD experimental engineer. Several of Mr. Larsen's experiments,

particularly the turning-circle tests, will be examined by the University researchers. Other investigations dealing with the efficiency of the four-wheel-drive principle of propulsion were conducted by Purdue University and Iowa State University in 1930 and 1931.

Truck-Mixer Bulletin

The 1947 line of Rex Moto-Mixers is illustrated and described in Bulletin No. 46-8, just released by the Chain Belt Co. Close-up photographs show the new water nozzle and its position in the drum, the bolted-on replaceable mixing blades, the patented air vent in the charging hopper, the chain drum drive, and other details.

Diagrams are also used to show the paths of mixing action, the rotation of the drum, the complete water system, etc. Information is given on chute lengths and the method of mounting. Included in the bulletin are two pages of job pictures, a complete set of specifications, and photographs of each of

the three drum sizes. Drum capacities of the three models when used as mixers are 2, 3 and 4½ cubic yards. When used as agitators only, their rated capacities are increased to 3, 4¼ and 6½ cubic yards respectively.

Chain Belt Co. manufactures the complete line of Rex construction

equipment which includes, besides the Moto-Mixer, water pumps, building mixers, Pumpcrete, pavers, and plaster and mortar mixers.

To obtain a copy of this booklet, write to the company at 1666 W. Bruce St., Milwaukee 4, Wis., and mention this item.

HIGHWAY CURING ECONOMY DEMANDS

KEYSTONE

KAPCO Concrete Curing Compound

Kapco Concrete Curing Compound continues to replace the less economical and outmoded methods of curing used in the past. Unaffected by wind or weather this membranous film provides the maximum moisture retention during the critical curing period and requires no after expense of a removal crew. Easily applied, this "wax-free" resin based compound prevents surface dusting, minimizes hair checking, crazing and reduces shrinkage. Write for complete information and technical data.



KEYSTONE ASPHALT PRODUCTS COMPANY

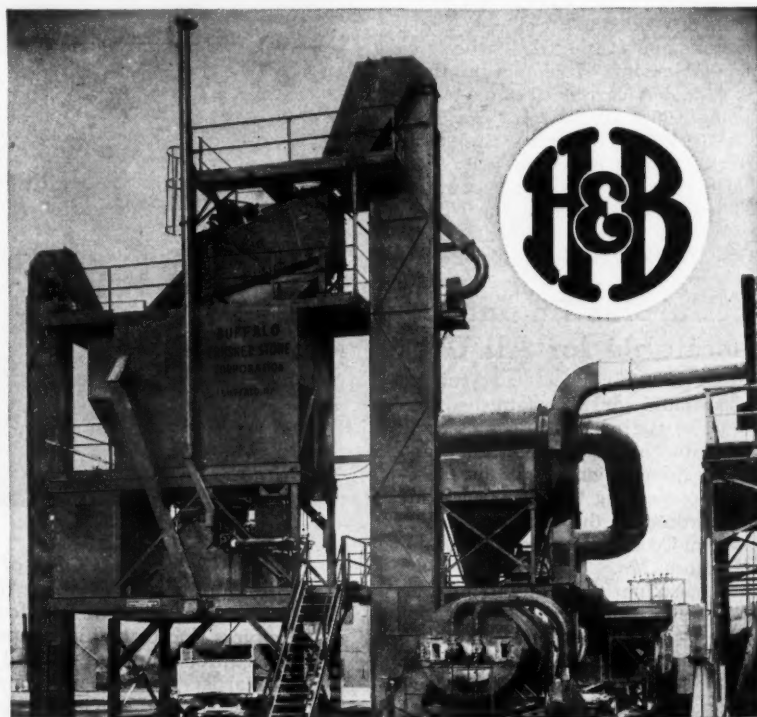
A Division of the American-Marietta Company
43 E. OHIO STREET, CHICAGO 11, ILLINOIS

ASK ABOUT THE NEW EQUIPMENT LINE FOR CONCRETE CURING COMPOUND APPLICATION



Beat the shortage in time, labor and material with a Mall Concrete Vibrator. It places concrete five times faster than hand puddling... It is easily transported and operated by one man... and it handles a stiffer mix, thereby saving sand, water and cement. In addition, Mall-vibrated concrete has increased compressive and flexural strength... assures greater density and watertightness... and provides better bond between successive layers and between concrete and reinforcements. Various models are available—1½ H.P. gasoline powered model; 3 H.P. round base or wheel barrow mounting; 1½ H.P. Universal Electric and 7500 r.p.m. Pneumatic unit.

Ask your Supplier or write Contractors' Equipment Division for literature and prices.
MALL TOOL COMPANY, 7743 South Chicago Ave., Chicago 19, Ill.



"GREATLY PLEASED WITH THE RESULTS OBTAINED"



THE MOTOPAVER

The new self-contained, self-propelled complete traveling mixer and paver. Mixes, spreads and lays any medium or low-cost type bituminous material—to any road width, thickness, crown. Bulletin MP-46 sent on request.

★ The H & B Portable Asphalt Plant shown above was delivered and put in operation last spring. Mr. F. W. Schmidt, president of the Buffalo Crushed Stone Co., owners, says: "After three months operation we want to tell you how greatly pleased we are with the results obtained. We are particularly impressed with the ease and economy of operation of the fluidometer and automatic mixing cycle. The product of this plant has met with very favorable acceptance from our customers."

H & B Portable and Stationary Asphalt Plants are available in a wide range of capacities. Write for literature.

HETHERINGTON & BERNER INC.
731 Kentucky Avenue, Indianapolis 7, Indiana

Hetherington & Berner



British Combine Photos

One of Britain's most urgent post-war tasks is the reconstruction of its war-damaged highways. Here a Barber-Greene Tamping-Leveling Finisher, one of twelve such machines now in use on trunk routes, resurfaces the London-Maidstone-Dover Road at the rate of $\frac{1}{4}$ mile a day. Left, Alfred Barnes, Minister of Transport, tries out the machine himself.

Mr. Barnes stated that this road will be renamed Battle of Britain Avenue.

ARBA Convention; 1947 Officer Nominees

The American Road Builders' Association has announced that its 44th Annual Convention will be held at the Palmer House in Chicago during the week of February 17, 1947. The Association program plans stress an airing of present-day problems, combined with committee reports on the new technical developments in road construction brought about by the war.

At the same time, the ARBA announced that its first post-war Road Show will be held in 1948 at Navy Pier in Chicago during the week of February 16. A complete line of new models in road-building equipment will go on exhibition. It is expected that by that time the improved equipment will be available for delivery. Also, tests will have been run to prove new models.

The ARBA Nominating Committee has issued a list of the official nominees for officers for the year 1947 and directors for three years. Ballots will be sent to members, as provided in the constitution.

Nominee for President is J. T. Callaway, Assistant to the Vice President, Goodyear Tire & Rubber Co. Nominees for Vice Presidents are: Paul B. Reinhold, President, Atlas Equipment Co., Pittsburgh; Charles W. Smith, President, Smith Engineering & Construction Co., Pensacola, Fla.; W. A. Roberts, Vice President, Allis-Chalmers Mfg. Co.; and Robert A. Allen, Nevada State Highway Engineer. Nominee for Treas-

urer is H. C. Whitehurst, Director of Highways, Washington, D. C.

Nominees for Directors, with terms ending in 1950, are: James C. Alban,

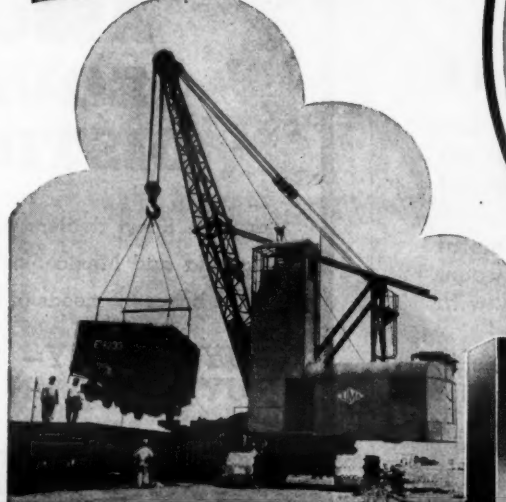
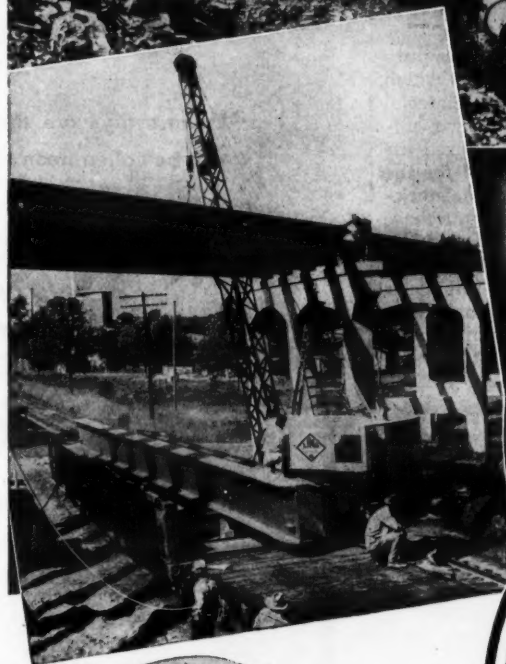
President, Alban Tractor Co., Baltimore; Perry T. Ford, Ohio Director of Highways; Frederick Hoitt, Secretary, New England Road Builders' Associa-

tion; E. R. Needles, Howard-Needles-Tamm & Bergendoff, Consulting Engineers, New York City; C. W. Phillips, Tennessee Commissioner of Highways and Public Works; Walter Toebe, Executive Secretary, Michigan Road Builders' Association; Charles M. Upham, Engineer-Director, American Road Builders' Association, Washington, D. C.

Bottled-Gas Torches

A leaflet describing its line of torches for soldering and maintenance work, its melting furnaces, and bottled-gas refills, has been made available by the Insto-Gas Corp., 1977 E. Woodbridge Ave., Detroit 7, Mich. The various pieces of equipment are illustrated and their specifications and features are listed.

Insto-Gas Corp. maintains a nationwide refill service of gas cylinders, with offices in principal cities. Its line has been approved as safe by the Underwriters Laboratories and Factory Mutuals Laboratories.



LIMA Cranes

LIMA cranes are in daily use on material handling jobs throughout the entire country. They are used for laying pipe, handling concrete and clamshell buckets, placing cut stone and structural steel, loading and unloading ships, log loading, magnet work and scores of other lifting jobs. Their modern design includes: INDEPENDENT OPERATIONS (hoist, swing, travel and boom up or down at the same time), AIR CONTROLLED CLUTCHES for easy and accurate control, LARGE DIAMETER DRUMS that accommodate long cables and effect maximum cable economy, and FAST, MOBILE CRAWLERS that steer from the cab with the cab in any position. LIMA gives you all of these important features—advantages so necessary for profitable crane operation. When you are looking for the most in crane value, why not look into the merits of LIMA cranes? *Bulletins are available on all types and sizes of LIMA cranes, shovels and draglines. Capacities given below.*

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TAMBLIN SYSTEM

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Permanent Runways Are Built at Airport

(Continued from page 2)

used for the surface treatment. At the other end of this runway a 2,000 x 150-foot landing strip was constructed with a 2-inch course of bituminous concrete.

The DeMatteo contract also called for the building up of 100-foot shoulders on each side of the two permanent runways. To obtain material for this fill, the contractor completely leveled Apple Island at the northeast corner of the airport and removed great chunks from the hill on Governors Island at the southwest end of the field. Three other Northwest 1½-yard shovels excavated the clay till on these islands; the hauling was done chiefly by eight 15-yard bottom-dump Euclids.

Safety Stressed

A busy airport with construction going on all around requires everyone to think safety if accidents are to be prevented. All personnel, both contractors and engineers, were given a typed sheet of instructions at the start of the job. This listed the do's and don'ts of conduct while working at the airport. High equipment, such as crane booms, carried flags by day and red lights at night. When a crane was not working, its boom was lowered to the ground. All equipment working within the runway area at night carried ample red warning lights.

The greatest precautions had to be taken with the movements of trucks which carried materials for the runway construction, since they had to cross "live" runway C on their way to A and B. Radio cars were posted at this and other danger points to receive messages from the airport control tower well before a plane was due to land or to take off. Since these radios were the one-way type, able to receive but not send, the men in the cars signaled back to the tower that its message was received and understood. Hand signaling by day and flashing car headlights by night were sufficient. Then the trucks were flagged to a stop until the plane had passed.

Perini Contract

B. Perini & Sons, Inc., started its contract in May. It worked in close con-

junction with the DeMatteo firm, for at one time all the operations from grading to final paving were going on along runway A. Actually only 6,300 feet of this runway had to be constructed, since its crossing of runway C and the approach to it on one side made up the total length of 7,000 feet. In addition to laying the stone base course and plant-mix paving, the Perini contract also included the installation of runway lights together with the necessary conduits. Another item was the dressing of the shoulders with loam taken from Apple and Governors Islands.

The first operation in this contract was further compaction of the newly laid gravel. This was accomplished with six passes from one of the six Caterpillar D8 tractors equipped with dozer blades which were on the project. Then followed the spreading of still another layer of gravel, 5 to 7 inches thick, until an elevation of 12¾ inches below the finished profile grade was attained. This material was obtained from a pit near Peabody. There it was dug out by a Lorain 2-yard shovel and hauled 15 miles to the job in from 60 to 70 trucks of assorted makes and sizes, all hired on the ton-mile basis. Three Austin-Western power graders on the project fine-graded this gravel to the exact elevation, as smooth-wheel rollers took care of the compaction. Available for rolling was a fleet of eight rollers. Five of these were Buffalo-Springfields, three 3-wheel 12-ton models and two 17 to 22-ton tandems; two were 3-wheel 12-ton Galions; and one was a 3-wheel 12-ton Huber.

Stone Base Course

Last winter the Massachusetts Department of Public Works, exercising great foresight, began to stockpile stone at one end of the airport. It intended to guard against possible scarcity this past summer should low production or strikes hamper delivery to the job. About 120,000 tons of stone was purchased from various quarries which delivered and stockpiled the material at the west end of the field. Two separate items in the contract covered the stone base work; one provided for the contractor to take stone from the stockpile, and the other for him to purchase the material from quarries. Actually both methods were used since the stockpile was insufficient for the full needs of the contract. The additional stone was purchased from the Lynn Sand & Stone Co. which delivered it to the job



C. & E. M. Photo

John DeMatteo stands beside an International Army truck converted, in his shop, into a dump truck to haul foundation gravel for the East Boston Airport runways.

from its quarry 5 miles away.

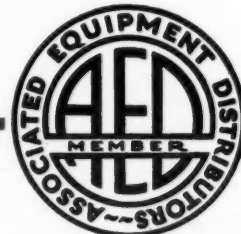
At the stockpile an Osgood Model 200 ½-yard shovel loaded trucks averaging 9 tons a load with the crushed

stone for the base course. The first course laid on the gravel was 6 inches deep. This was spread with a special box
(Continued on next page)



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Permanent Runways Are Built at Airport

(Continued from preceding page)

made by the contractor and fastened to the front end of a D8 tractor. Two small steel wheels at the front of the box enabled the tractor to push it along easily, while directly behind the box a V-shaped blade leveled the stone and spread it towards the fins at the sides. These side plates prevented the stone from feathering out and losing depth. Built of steel, the spreader box is adjusted by three controls. These raise or lower the blades and plates, and permit the stone to be spread, if necessary, from 1 to 14 inches thick and 12 feet wide. With this box the average-sized truck holding from 8 to 10 tons was emptied in 5 minutes as the tractor pushed it along. On the 6-inch base course the tractor-spreader combination laid an average of 2,000 tons of stone in an 8-hour day.

As the stone was laid it was compacted by three complete passes of a D8 tractor. The grade was checked by stringing lines between steel pins placed every 15 feet along each 12-foot lane being spread. Stone was added or removed, if necessary, to bring the top plane of the stone level with the grade marked on the pins. This checking was done by a couple of men with forks who followed the tractor-spreader. The interstices in the stone were then filled with a fine stone dust from a couple of Buckeye spreaders hooked to the backs of the trucks. The course was compacted some more by the tractors and then rolled by the smooth-wheel rollers. More dust was added and the base rolled until the 6-inch course was firmly bonded. Besides the rolling, a broom drag was a big factor in working the dust well down into the stone. Pulled by a rubber-tired Euclid, the drag was made up of a 9 x 12-foot wooden frame with four brooms of 6-inch fiber bristles. It was weighted with a box of stone carried on top to make it ride low and force the dust deep into the base.

This bottom course of stone and dust was topped right away by another layer of stone 4½ inches deep and rolled by the smooth-wheel rollers. Most of this second course was spread and shaped by the power graders to conform to the 1½ per cent slope from the center line of the runways 150 feet to the edge. Stone for both these courses is known as 2-inch stone; that is, it has a gradation of from 2 inches down to ½ inch. About 40 trucks of various makes and sizes were hired by the hour for hauling the stone and dust.

This last layer of stone was then covered with 85 to 100-penetration asphalt. It was applied at the rate of 1½ gallons to the square yard by an Etnyre 1,000-gallon distributor, with a 13-foot spray bar, mounted on a Mack truck. This work was done by the Tri-mount Bituminous Products Co. of Everett, Mass., located about 5 miles from the airport. The hot asphalt was then covered with peastone graded from ½ inch down to No. 8. It was distributed at the rate of 20 pounds to the square yard by means of a Temple stone and chip spreader fastened to the rear of a Mack truck capable of holding 11 tons of the fine stone. This stone was well rolled into the asphalt and base course with at least six passes of the smooth-wheel rollers.

Asphalt Plant

B. Perini & Sons, Inc., gave a sub-contract for laying the bituminous-concrete pavement to the John McCourt Co. of Boston. This company set up a new Cummer asphalt plant at the west end of the field and began turning out the hot-mix on July 1. While the plant was located on a siding of the B. & A.

railroad, all the sand and stone for the mix was purchased from various local commercial sources within 15 miles of the job site. Trucks delivered and stockpiled the material. Then a Lorain crane with a 50-foot boom and a 1½-yard clamshell bucket loaded twin McCourt-made bins, one for sand and the other for stone, each with a capacity

of 75 tons. An International tractor-dozzer pushed the sand and stone to the crane.

From these bins the sand and stone were chuted to a point midway between them. There they were loaded to a bucket conveyor and carried 30 feet to one end of the 30-foot-long x 6-foot-diameter drier. The plant was driven

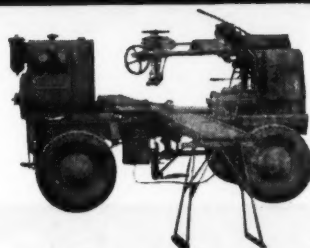
by several electric motors, a 5-hp unit operating the cold elevator, and a 50-hp motor turning the drier and pugmill. The motors were the latest type of induction units with the motor and gear box contained in the same unit, thereby greatly reducing the physical dimensions of the set.

(Continued on next page)

Idle crawlers earn no money

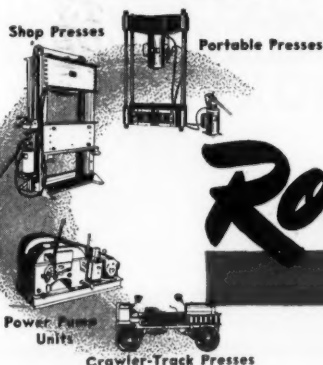


... here's the way to whip them back in service
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Your dealer probably has Rodgers Track Servicing Presses in his service department for the purpose of helping you maintain your equipment. If he hasn't and your requirements won't justify your having a Rodgers Press of your own, urge him to investigate the savings of a Rodgers. It will pay you both!



Rodgers crawler Presses track

IT'S A WASTE OF TIME to lay up crawler-tractors a couple of days for routine track maintenance—it's unnecessary to slug the pins and tug or burn stubborn nuts. A Rodgers Track Press does the track service job . . . so easily . . . so fast. It takes just an average 3 or 4 hours machine time to service two large strings of track—and you can do it on the job with a Portable Rodgers.

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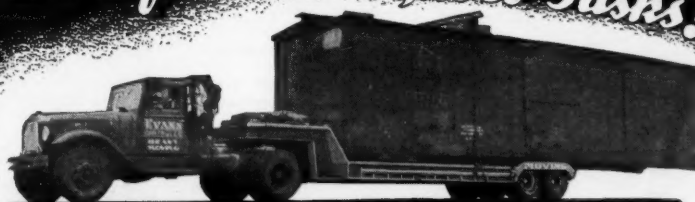
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Permanent Runways Are Built at Airport

(Continued from preceding page)

As the stone enters this plant drier it is heated at that end by an external torch blowing into a firebox built around the drier. At the discharge end an internal torch is directed into the big cylinder. Both Hauck torches burn No. 5 fuel oil atomized by steam, with the oil supplied from a 7,700-gallon tank located alongside a 10,000-gallon asphalt tank.

On this contract, the operator of the cold elevator also watched a Bristol pyrometer at the side of the drier to see that the temperature of the stone was held between 250 and 350 degrees F. If the temperature rose too high, he speeded up the feeding of the sand and stone to send them through the drier faster; if the temperature dropped he slowed down the feed.

An efficient dust-collecting system was designed by John McCourt for use at this plant. From the intake end of the drier a 24-inch corrugated-metal pipe, supported high in the air for its 80-foot length on three A-frames, ran out to an old destroyer smoke stack 25 feet high and 7 feet in diameter at the top. The pipe entered the closed stack at a point a little higher than halfway above the ground, and the dust gradually settled to the bottom. Baffle plates built into the sides of the stack together with a steam line prevented the dust from rising and speeded the settling process. The dust was pulled from the drier into the collecting system by a 4½-foot-diameter Buffalo Forge fan driven by a 20-hp motor at 1,800 rpm, which also created good combustion in the fire chamber.

From the discharge end of the drier, the heated sand and stone slid down an enclosed chute to the bottom of an enclosed 40-foot hot elevator operated by a 7½-hp motor which raised the material on buckets to the top of the new Cummer plant. Up here the aggregate was spread out over a Robins Vibrex 4 x 10-foot double-deck vibrating screen driven by a 5-hp motor at 1,400 rpm. The upper deck of the screen was divided into ¾ and 1-inch sieves, while the lower deck had No. 8 and 1½-inch mesh openings. Anything over an inch in size slid down the tailing chute

and fell out below. The screened aggregate was then collected into four bins with a total capacity of 65 tons. These oversize bins were built specially by the Cummer Co. for this particular job, as the normal-size bins for this plant hold 40 tons. A system of weights and cords showed how full a bin was at any time.

The plant operator, by pulling a lever for each bin, admitted the aggregate into a weigh box where its weight was indicated on a Fairbanks-Morse dial scale. Across the operator's platform was a similar scale on which was weighed the asphalt which had been pumped from the supply tank by a Kinney pump operated by a Troy steam-driven engine.

The hot asphalt makes a continuous loop in a 3-inch pipe jacketed in a 6-inch pipe. The pipe is heated by live steam from an International Engineering 100-hp vertical coal-burning boiler which furnishes steam for all plant operations. By means of a by-pass

valve the plant operator can either admit the asphalt to the weigh bucket or send it back to the supply tank since the pump, working continuously, keeps the bitumen in constant circulation.

Steam from the boiler was also used to heat the asphalt in the supply tank, the aggregate in the weigh box, and to open the gates on the 2-ton pugmill after the aggregate and asphalt had been mixed for 1½ minutes. A concrete-base foundation was built under the plant so that the trucks could drive through, pick up their loads, and on the way out of the yard get weighed on a Howe beam scale. Four Sterling trucks, of 10-ton capacity, were hired on a ton-mile basis from John S. Sliney of Belmont, Mass., to haul the plant-mix to the runways, an average distance of about 3 miles.

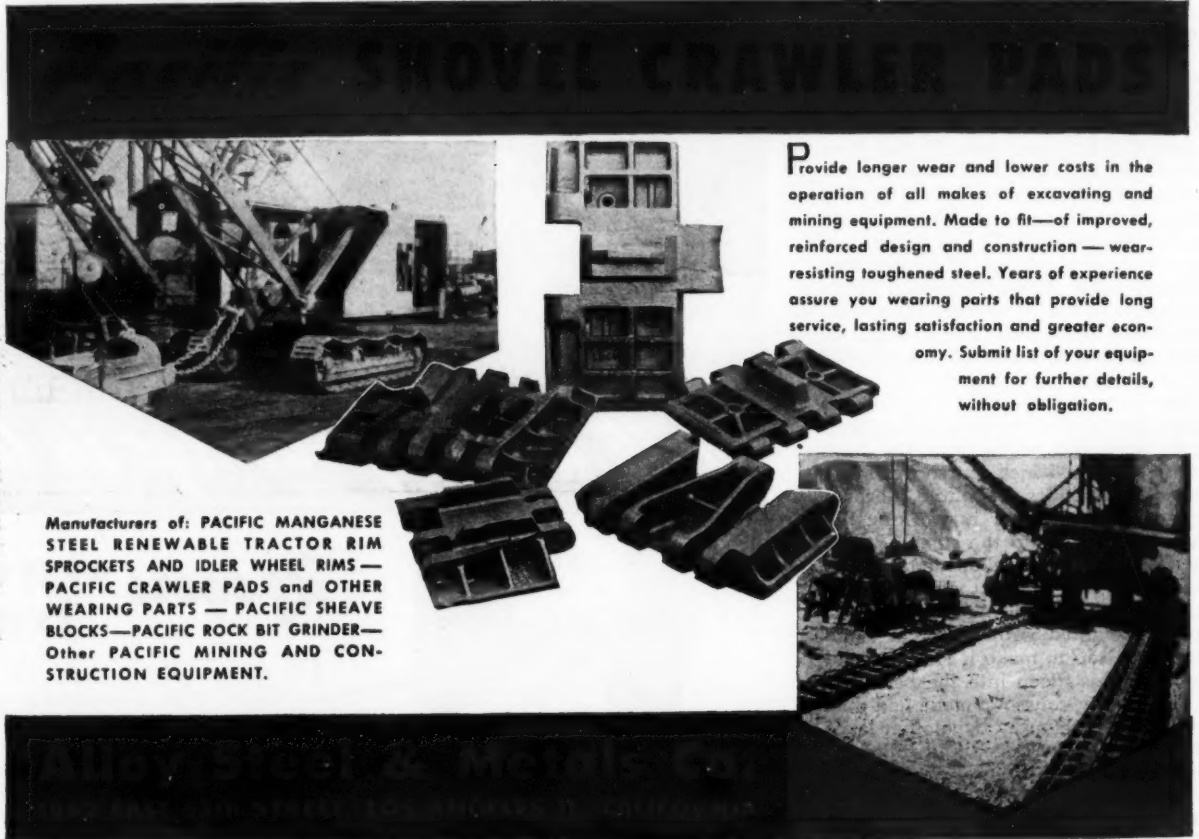
A crew of seven was required at the plant, which produced an average of 600 tons in an 8-hour day. The 100 to 120-penetration asphalt was purchased

from the Trimount Bituminous Products Co. of Everett, Mass., which delivered the bitumen in truck-trailers from its plant 5 miles away.

Laying Pavement

At the runways the hot-mix was laid at an average of 300 degrees F in two courses, the base or binder being compacted to 1¼-inch thickness, and the top course to a 1-inch thickness. Two Adnun Black Top Pavers did the spreading. One of these, a new machine driven by a 6-cylinder engine, laid the mix in 12-foot lanes, emptying a 10-ton truck in 4 minutes. The older and smaller machine, working on a 4-cylinder engine, spread the mix in 10-foot lanes, emptying a 10-ton truck in 6 minutes. Only one machine was used at a time, the procedure being to run out from 400 to 600 feet with one unit, then load the crew members on to the empty haul truck, and return them to

(Concluded on next page)



Provide longer wear and lower costs in the operation of all makes of excavating and mining equipment. Made to fit—of improved, reinforced design and construction—wear-resisting toughened steel. Years of experience assure you wearing parts that provide long service, lasting satisfaction and greater economy. Submit list of your equipment for further details, without obligation.

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McKiernan-Terry Bulletin No. 57 gives diagrams, specifications, operating notes, etc. Copy sent free on request.



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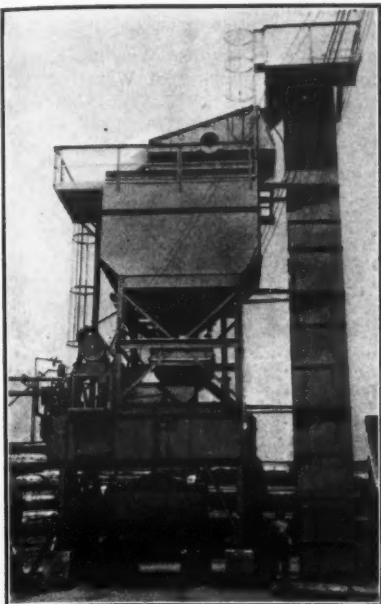
Please help the National Cancer Foundation to build HOPE INSTITUTE . . . the world's first model hospital for the care of advanced cancer patients. Send as generous a check as you can to:

THE NATIONAL CANCER FOUNDATION

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C. & E. M. Photo

This Sterling truck receives a 10-ton load of binder course from the Gummer asphalt plant set up by John McCourt Co., subcontractor for the bituminous-concrete runway pavement.

Permanent Runways Are Built at Airport

(Continued from preceding page)

the point of beginning where they manned the other machine and laid an adjacent lane. In the meantime one operator returned the other paver to the starting point where it would be ready for use as soon as another lane was completed. This man's job was to bring the pavers back to the beginning of the work, and keep the machines fueled and greased and ready for action. As the work was all straight running the field crew was small, each paver requiring only an operator together with two rakers and a shoveler.

Each course was thoroughly compacted. The longitudinal rolling was done by a Buffalo-Springfield 18-ton 3-axle tandem roller, while the cross rolling was handled by an 8 to 10-ton tandem Buffalo-Springfield. The gradation of the bottom and top courses was as follows:

Sieve Size	Per Cent Passing	
	Bottom	Top
1-inch	100	....
3/4-inch	35-65	....
1/2-inch	10-30	....
No. 4	5-15	20-60
No. 10	2-10	30-45
No. 20	2-8	4-16
No. 40	2-10	6-20
No. 80	1-6	5-16
No. 200	1-6	4-9
Asphalt	4-6	5-8

Typical batches by weight of both courses were as follows:

Material	Binder		Top	
	Lbs.	%	Lbs.	%
Sand (No. 4 to No. 200)	1,060	26.5	1,600	40.0
3/4-inch stone (No. 4 down)	432	10.8	680	17.0
1/2-inch stone (1/2 inch down)	320	8.0	1,488	37.2
3/4-inch stone (3/4 inch down)	2,000	50.0	....	....
Asphalt (100 to 120 penetration)	188	4.7	232	5.8
	4,000	100.0	4,000	100.0

Quantities and Personnel

The major items included in the \$2,-302,680.75 contract of the M. DeMatteo Construction Co. were:

Excavation	468,500 cu. yds.
Gravel borrow	1,063,000 cu. yds.
Clay-till borrow for shoulders	226,000 cu. yds.
Tar	66,000 gals.
Asphalt	66,400 gals.
Peastone	700 tons
Bituminous concrete	2,000 tons
Corrugated-metal pipe, 6-inch, asphalt-coated	7,400 lin. ft.
Reinforced-concrete pipe, 18 to 36-inch	2,900 lin. ft.
Subdrain, 6-inch	38,400 lin. ft.

In the B. Perini & Sons, Inc., contract of \$1,267,745 the major items included:

Gravel borrow	108,000 cu. yds.
Crushed stone	190,000 tons
Asphalt	439,000 gals.
Tar	12,000 gals.
Peastone	4,600 tons
Bituminous concrete, bottom course	38,400 tons
Bituminous concrete, top course	25,600 tons

With the completion of these two permanent, 7,000-foot runways, the East Boston Airport is assured of adequate facilities for handling the big transatlantic and transcontinental planes which previously had been getting along on a temporary 7,000-foot, and two other runways 5,900 and 4,000 feet long. Both of the new runways were scheduled for use by December 1.

Julius J. Waldman is Resident Engineer for the Massachusetts Department

of Public Works in charge of the two construction contracts at the airport. The Department is headed by Joseph F. Cairnes, Commissioner, with P. H. Kitfield, Chief Engineer; Francis T. McAvoy, Construction Engineer; C. A. Fritz, District Highway Engineer; and L. J. Fritz, District Construction Engineer.

The activities of the M. DeMatteo Construction Co. were directed by the two DeMatteo brothers, John and Martin, with Roland S. Delaware as Day Superintendent, and Francis Tupper as Night Superintendent. Louis Capone was Superintendent for B. Perini & Sons, Inc. For the John McCourt Co., which did the bituminous-concrete paving, Frank McCourt, Jr., was Superintendent in charge of the paving, while James Durkan was Superintendent at the asphalt plant. During the peak of construction about 700 men were employed.

To secure catalogs reviewed in this issue, write us and we'll do the rest.

Two New Sheet-Piling Sections Weigh Less

The highest interlock strength with a minimum of weight is claimed for the two new heavy-duty straight-web sections of sheet piling announced by the Carnegie-Illinois Steel Corp. Completely new in design, these sections are intended for the same applications as M-108 and M-107, which will now be obsolete.

Known as MP-102 and MP-101, the new sheet-piling sections reflect a weight saving over the superseded sections of 3 pounds per square foot. MP-102 weighs 40 pounds per foot, and 32 pounds per square foot. It has a 1/2-inch web thickness. MP-101 has a 3/8-inch web thickness, weighs 35 pounds per foot, and 28 pounds per square foot.

Carnegie-Illinois has prepared a specification sheet for the new piling sections. To secure your copy, just drop a line to the firm at 434 Fifth Ave., Pittsburgh 30, Pa.

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A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

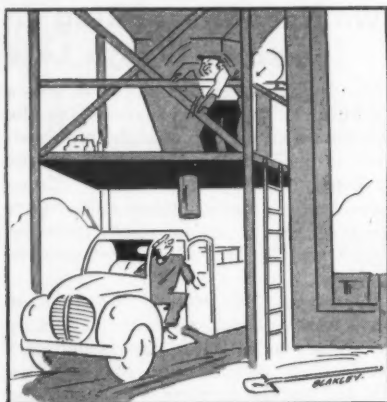
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"Listen, wise guy, I'm running this batcher. Stop commanding 'You may fire when ready, Gridley!'"

New Reference Book Covers Soil Testing

"Soil Tests for Military Construction", an address by Major George E. Bertram, U.S. Army Corps of Engineers, which was delivered at the American Road Builders' Association convention in Chicago last January, has been issued in manual form, with an appendix. The manual was prepared with the help of the Graduate School of Engineering of Harvard University.

The principal wartime significance of soil testing was in connection with the building of combat airfields. The principal conclusion of value to peacetime construction which can be drawn from this review of military soil-testing equipment and procedure is that a more widespread use can be made of extremely simple and very economical laboratory sets. This equipment should prove of particular value to agencies contemplating airfield development or road-construction projects where the facilities of large soil-testing laboratories are not available.

The manual is divided into five main sections: (1) field identification of soils, (2) equipment, (3) laboratory set-ups, (4) soil exploration and sampling, and (5) test procedures. Each of the sections is well illustrated by line drawings, photographs, and charts. The reason for this type of treatment is that the manual is intended as a guide to personnel doing the actual work of soil sampling and testing, who may not have had any previous soil-mechanics experience. By providing very clear instructions, it is intended not only to

assist the engineer in his task of instructing his crew, but also to provide a ready, understandable source of reference.

The section on field identification of soils provides information on all the visual methods of determining soil types. It stresses correct soil identification and continual checking of field identification with laboratory results.

The next section lists and identifies all the equipment items necessary, and instructions for their care and adjustment. Supplemental notes are included on items of equipment which can be improvised in the field.

The section on the laboratory set-up enumerates the major considerations which must be observed in setting up the laboratory equipment in order to perform tests to the best advantage and protect the equipment.

Procedures for taking bag, moisture-content, and undisturbed samples are given in the section on soil exploration and sampling. Instructions for taking notes, preparing layout sketches of explorations, and numbering and shipping samples are included.

The procedure for performing each test is given in step-by-step form. Sample calculations are shown for the data; and when curves are required to be plotted, examples show the method for plotting the points and utilizing the resulting graphs. A brief outline is included in the test-procedure section on methods for making field bearing tests and traffic tests, although it is considered that a discussion of such tests is beyond the scope of the manual.

Single copies of the 95-page booklet are free to members of the ARBA, but are sold at the rate of 50 cents a copy when a number of copies are desired. These copies may be obtained by writing to the American Road Builders' Association, Airport Division, 1319 F St., Washington, D. C.

Western Machinery Names McGuire for Utah Branch

The appointment of L. T. McGuire as Manager of its Salt Lake City branch has been announced by the Western Machinery Co. Mr. McGuire has many years of experience in the sales and service of heavy machinery to the contracting market. He was formerly with the Byers Machinery Co. and the Harnischfeger Corp., and is a graduate engineer from Ohio Northern University.

The Western Machinery Co. has operated in the Salt Lake City territory since before 1919. It started originally as a mining-machinery company, but expanded its lines to include construction equipment and an engineering design and construction service. The Salt Lake City branch is located at 748 W.

8th St., South.

The company is the distributor for Wemco Products, Western-Knapp Engineering Division of Western Machinery Co., The Jaeger Machine Co., Austin-Western Co., Independent Pneumatic Tool Co., C. S. Johnson Co., Union Wire Rope Co., and others.

GIVE EQUIPMENT LONGER LIFE HARD SURFACE WITH P&H "ABRASOCOTE"

Now! Two brand-new P&H electrodes to give you longer lasting surfaces—less maintenance costs. Use Abrasocote on parts requiring high resistance to impact and abrasion—and double their lives.



"Abrasocote" is available in two types — Nos. 10 and 20 — to give you the surface hardness jobs require. Easy to use, they operate equally well on AC or DC. Take advantage of their important time, money, machinery saving benefits. Get information from your P&H representative or write us.

"ABRASOCOTE 10"

Harder than No. 20, it's for parts subject to rolling or sliding abrasion, batter and impact. Applications include tractor treads, drive sprockets, cams, crusher hammer, etc. Rockwell C hardness 35-40.

"ABRASOCOTE 20"

For high resistance to impact, heat, corrosion, abrasion. Deposit work hardens under impact. Use on high carbon manganese cast steels. Rockwell C hardness 25-35.

P&H also makes other electrodes in all types and sizes — AC or DC — for welding all steels and for building up and hard surfacing.

P&H
WELDING
ELECTRODES
HARNISCHFEGER
CORPORATION

General Offices:
4419 W. National Ave.
Milwaukee 14, Wis.

puts the weight . . .
where it's needed!



... the 3-axle tandem

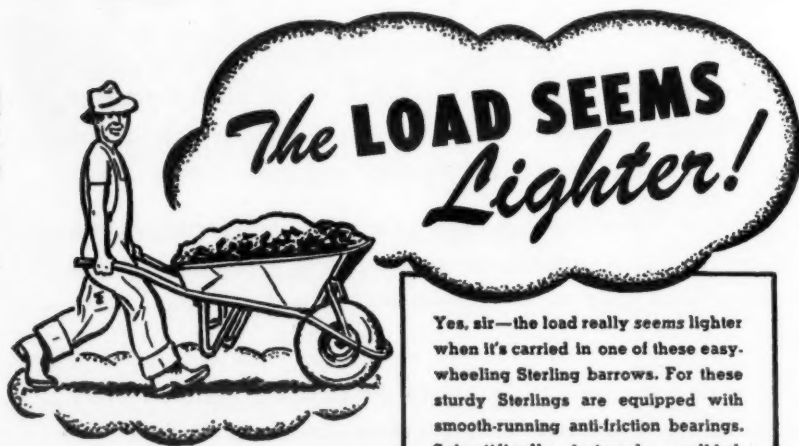
SURFACE irregularities vanish under the 3-axle tandem. As any one roll contacts a high spot, it automatically "borrows" additional weight for greater compaction. This, together with exclusive Buffalo-Springfield *synchronized steering* of the two guide rolls makes possible smoothness of rolling not possible with any other equipment. Ask your distributor for details.

3-AXLE TANDEMS
9 to 17 tons

TANDEM ROLLERS
3 to 14 tons

3-WHEEL ROLLERS
6 to 12 tons

TRENCH ROLLERS



Yes, sir—the load really seems lighter when it's carried in one of these easy-wheeling Sterling barrows. For these sturdy Sterlings are equipped with smooth-running anti-friction bearings. Scientifically designed . . . well-balanced . . . actually 80% of the load is carried by the wheel; only 20% by the operator. While deliveries are still retarded, due to the material situation, we'll make every effort to serve you as soon as conditions permit.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Sterling
WHEELBARROWS

Look for this Mark of
STERLING Quality



BUFFALO  **SPRINGFIELD**
SPRINGFIELD, OHIO

The Oldest and Largest Builder of Road Rolling Equipment in America



This safety device can be bolted to either side of a dump truck to block up the raised body. B. F. McDonald Co. makes it.

Safety-Block Device for Dump-Truck Body

The danger of working under raised truck bodies can not be overemphasized. More and more, state legislatures are requiring that proper measures be taken to block up the body in order to obtain increased workman safety.

A dump-truck safety block has been put out by the B. F. McDonald Co., 5112 So. Hoover St., Los Angeles 37, Calif. It is said to prevent creeping or falling truck bodies and hoists from catching and injuring men working underneath. Made of strong silica-alloy aluminum, a block is bolted permanently to either side of the dump bed so that it is unnecessary to lower the truck body onto the blocks to make them slip-proof. These blocks are hinged, so they may be swung down and out of the way when not in use, and swung up into position again after the truck bed or hoist has been raised.

They are said to be capable of withstanding loads up to 100,000 pounds without any sign of failure. They are sold singly or in pairs, and in two styles: heavy-duty, for use on trucks of 3 to 6 tons; and light-duty, for trucks of 1½ to 2½ tons.

Additional information and catalogs may be obtained directly from the manufacturer by referring to this news item.

Davey Names Distributor

Appointment of Contractors Machinery Co., Inc., Kansas City, Mo., as distributor of Davey compressors, was announced recently by Paul H. Davey, President of Davey Compressor Co. The new distributor will offer complete sales and service facilities on all items of

Davey manufacture, which include portable and stationary compressors, truck power take-offs, Auto-Air and Track-Air units, etc. A fleet of rental compressors will be maintained.

The new distributorship will include the counties of Mercer, Grundy, Livingston, Carroll, Saline, Pettis, Morgan, Camden, Laclede, Wright, Douglas, Ozark, and west to the eastern borders of Oklahoma, Kansas, and Nebraska.

Lister-Blackstone Makes Plant and Policy Changes

A new set-up in the manufacture of its diesel engines is announced by Lister-Blackstone, Inc.

A departure from its past policy will be an almost complete concentration on the production of straight diesel engines. While there will be some adaptations, such as power take-offs, irrigation pumps, and possibly marine propulsion units, no diesel generator sets or combination auxiliaries will be produced.

All production has been moved to a new modern plant equipped with up-to-date tools and machines. The change will result in greater production and better engines, according to F. Rankin Weisgerber, Executive Vice President.

A new parts department has been established at 1568 W. Pierce St., Milwaukee. All business will be transacted from a new downtown office at 740 No. Plankinton Ave., Milwaukee 3, Wis.

AC-Generating Equipment

Generating ac electric power "all over the world" is the slogan of a new 10-page catalog issued by the Kato Engineering Co., Mankato, Minn. Kato-light power plants, independent generators, high-frequency generators, and rotary converters are among the products shown. Copies will be sent on mention of this notice.



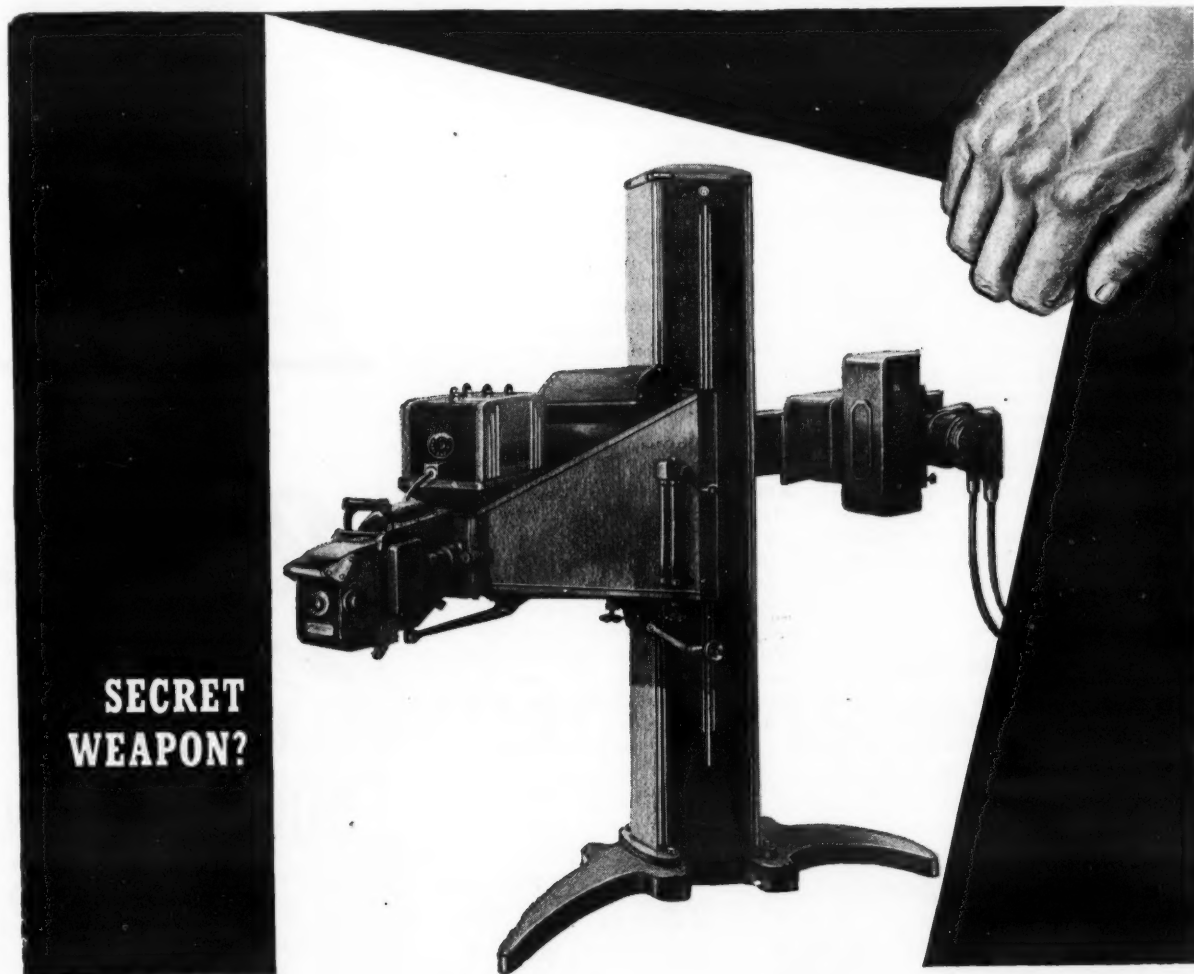
WIRE ROPE SLINGS

1½" diameter, 6x19 galvanized improved Plow steel cables. Overall length, 12' 6"; cable length 11' 4". Complete with fittings as shown. This War Surplus is offered at a fraction of its original cost.

BROWN-STRAUSS CORP.

1410 Guinotte Ave.

Kansas City, Mo.



**SECRET
WEAPON?**

Here's one "secret weapon" that needs to be unveiled in every corner of the land...

THE ENEMY: Tuberculosis, the dread White Plague which kills more Americans between 15 and 35 than any other disease.

THE WEAPON: The X-ray, surest means of catching TB early, when it can be cured more easily and before it spreads.

Christmas Seal money fights TB in many ways; one of the most important is to buy X-ray units and promote mass examinations. Please, send in your contribution today.



Because of the importance of the above message, this space has been contributed by

**BUY
CHRISTMAS SEALS**

Contractors & Engineers Monthly

CUMMER ASPHALT PLANTS

EIGHT SIZES

Up to 1000 Tons per day

DRYERS

Two-Fire and Internal
Fire

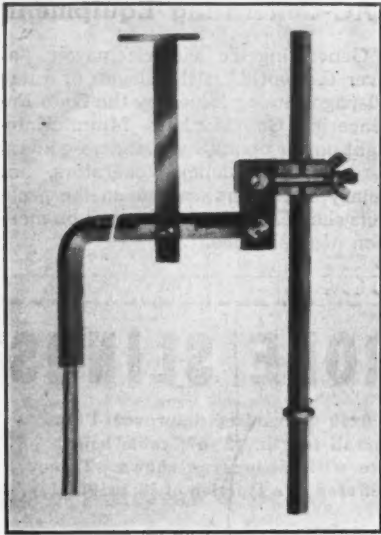
30 to 100 Tons per hour

Electric Batch Timers

50 Years' Experience

THE F. D. CUMMER & SON CO.

EAST 17th & EUCLID
CLEVELAND 15, OHIO



A new device to remove a drill which is stuck in the drill hole is made by the Universal Pneumatic Tool Co.

Drill-Steel Guide And Drill Ejektor

A device for removing a drill that has become stuck in a drill hole has been announced by the Universal Pneumatic Tool Co., Inc. The Maloney drill-steel ejektor is designed to release the drill in a matter of seconds. The operator attaches the ejektor clamp to the drill steel, removes the hammer from the drill-steel shank, places the hammer on the round shank of the ejektor, and turns on the air.

At the same time, the company also announces the Maloney drill-steel guide for use with either air hammer or sledge. The guide holds the drill steel in place; it is said to make a one-man job out of what is usually a two-man operation. The guide may also be used to drill holes in the side of a boulder so it can be broken with the grain. A flexible chain is provided to hold the guide in place.

Further information may be obtained from the company at 722 Chestnut St., St. Louis 1, Mo. Mention this news report.

Rayon Cord in Tires

The facts about rayon cord in tires are summarized in a little booklet just issued by the American Viscose Corp. Serving as a report to tire users, the booklet first explains the functions of

the cord and of the tire, then compares the characteristics of rayon and natural cords.

Copies can be secured from the firm at 350 Fifth Ave., New York 1, N. Y. Just mention this item.

Quick Cost Figuring For Truck Operation

A complete set of sample forms with which to set up simplified operating-cost records is available to truck owners upon request to The Four Wheel Drive Auto Co. The system was developed by the FWD Service Department during many years of truck manufacture and repair. It is offered as an aid to owners who do not wish to set up an elaborate cost-keeping system, but who want some such system in order to determine whether or not they are receiving maximum efficiency from their equipment. Only four forms are used: the driver's daily report, repair-labor slips, a monthly report, and a yearly report.

The driver's daily report is a running account of the truck's performance; it forms the basis for the monthly and annual operating-cost reports. The information it contains includes vehicle make and number, driver's name, date of operation, miles and time in and out, total miles for the day, loads hauled in tons or gallons or yards, gas and oil purchased, repair parts and labor on the road, grease, wash, storage, miscellaneous costs, and any remarks as to parts that need attention or repair.

Each time a truck is repaired, a repair-labor slip is turned in to the office by the mechanic. This contains the date, name of mechanic, truck number, make of truck or trailer, description of work, and total hours of repair labor. Each day, the information on the driver's daily report of a truck is transferred to the monthly report. When a repair-labor slip is turned in, that information also is entered on this form.

The annual report lists each month's operation separately and can be used as a basis for comparison. Its items are similar to those on the daily and monthly report sheets, except for additional space where the cost of operation may be broken down to show cost per mile, per ton, per hour, and per ton-mile. Space has been allotted at the bottom of the page on which to list the date the truck was purchased, yearly cost of depreciation, insurance, and license.

These four reports are said to be sim-

ple and easy to maintain, yet to cover all of the items essential to cost keeping. Totals arrived at in compiling them for the various trucks in a fleet supply a basis for charging for outside work, for estimating future jobs, and for determining the relative efficiency of trucks. Excessive costs in fuel consumption,

repair, etc., show up clearly so that economy measures can be taken.

A sample set of these forms can be obtained by writing to the Cost Records Department, Service Division, The Four Wheel Drive Auto Co., E. 12th and Auto Sts., Clintonville, Wis. Mention this report.

**"U.S." BUILDS THE RIGHT
ELECTRIC PLANT
FOR YOUR NEEDS!**

**1500 WATT
PORTABLE**

- For Operating Power Tools
- Floodlights • Field Repair Shops • On Service Trucks • Paving Machines • Power Shovels • Earth Moving Equipment, etc.

"U.S." BUILDS A COMPLETE LINE of Gasoline and Diesel Electric Plants up to 140 KW—for stand-by, continuous duty, battery-charging, and portable uses. Skids, rings, porter bars, and trailer mountings available. Write for literature, stating type of unit and capacity required.

UNITED STATES MOTORS CORP.
554 Nebraska Street Oshkosh, Wisconsin
Factory representatives strategically located throughout U.S.A. and Canada.

**POWER
and Speed**

to do the job!

**DUFF-NORTON
JACKS**

RATCHET JACKS

SCREW JACKS

AIR MOTOR JACKS

HYDRAULIC JACKS

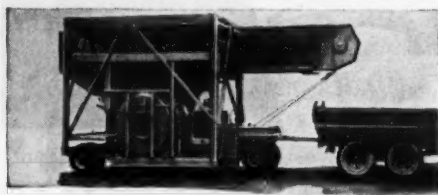
**DESIGNED
and BUILT for HEAVY DUTY
CONSTRUCTION SERVICE!**

For speed, power, huskiness and ease of operation—Duff-Norton Jacks are unexcelled. Every Jack in the complete Duff-Norton line is made to take tough treatment—made to give you many years of easy-operating, dependable service!

Check your industrial distributor for the facts on Duff-Norton Jacks for construction work. He'll be glad to specify the right Jacks for your specific requirements! Call him today!

THE DUFF-NORTON MANUFACTURING COMPANY
PITTSBURGH, PENNA.

There is a Representative near you!



**30* CU. YD.-HR
PORTABLE
CONCRETE PLANT**



Write for Data

STRAYER Portable CONCRETE PLANTS

Erie Steel Construction Co., 2612 Geist Rd., Erie, Pa.

BUCKETS • AGGREGATES • PORTABLE CONCRETE PLANTS

CAPACITY OF PLANT

Up to 30 cu. yd./hr depending on mixing time.

CAPACITY OF MIXER

Full 3/4 cu. yd. with 10% surcharge capacity.

CAPACITY OF BIN

20 Cu. Yd. heaped 3 equal compartments.

CAPACITY OF AGGREGATE

Full 3/4 cu. yd. with suspension type scale.

CAPACITY OF ELEVATOR

60 Tons/HR handling material weighing 100lbs. per cu. ft.

OPERATING CONTROLS

All Mixer Bin and Aggregate Gates hydraulically operated with control levers banked at operator's position.

* 40 Cu. Yd/HR Plant also available.



C. & E. M. Photo
This Bucyrus-Erie 37-B dragline, part of the equipment of the A. Guthrie Co., removes a silt pocket in the Northern Pacific railroad-bed cut.

Big Dirt-Moving Job For RR Line Change

(Continued from page 1)

right-of-way. Occasionally the machines ran into a grade of coal good enough to burn in stoves and furnaces. When this happened, the word got around the country like magic. Farmers with wagons showed up on the dump grounds and laid in their supply of fuel for the winter.

Lignite seams were ripped up by a Rooter, and scoria pockets were also broken up by this unit. In general, all excavated material except lignite was used in the fill, and many acres were purchased along the railroad for borrow pits for fill. The scoria was found to be excellent for drains, and wherever possible it was saved for that purpose. One creek bed intersecting the new railroad was deepened and straightened to approach a new bridge, and the material was used in the fill.

Earth-moving on this new job was blessed by an exceptionally dry spring season. Rainfall was so intermittent that operations seldom were hindered. Dirt work was carried on for two 10-hour shifts, with heavy equipment serviced once a shift.

In the cut sections the contractor occasionally excavated to grade only to find that the subsoil consisted of silt pockets. When this condition was encountered, a Bucyrus-Erie 37-B dragline with a 1½-cubic-yard Amsco bucket was used to remove the pocket. It was then backfilled with either solid dirt or scoria. The 37-B machine was equipped with a 50-foot boom for long reach, and was employed principally on casting. This machine was also used to dig out for drains, and to set a few reinforced-concrete culverts in place to be covered by fill.

Excavation was carefully balanced out as far as possible by Contract Superintendent H. A. Griffiths, who studied the cuts carefully and figured the shortest possible haul for all material. Individual studies were made of each big cut to determine on which side the fill should go, or, if the earth should be divided on both sides, by what per cent. In cut sections the bottom width finished was 40 feet, except in a few special instances where the character of the material encountered required a somewhat wider base. This is considerably wider than the old track, and was so designed to reduce maintenance of slides to a minimum.

Eastern Half of Job

The eastern half of this new Northern Pacific Railway location was pushed rapidly ahead by contract with Foley Brothers of St. Paul and the Marsch-Peterson Co. of Omaha, Nebr. Their \$450,000 contract called for the excavation and placing of 1,500,000 cubic yards of earth work for the new railroad foundation.

With seven Euclids on a 1-mile haul, yardage output at the rate of fifty-five 11-yard loads in 10 hours was possible on this half of the contract. The material is much the same as that encountered on the western half, but equipment was somewhat different.

An Adams 48-inch elevating grader was used on the eastern half of the job to load four bottom-dump Euclids and five end-dump Euclids. This machine was generally put in unrooted clay cuts, digging 24 inches deep at a pass. Loading speed of this elevating grader was 15 cubic yards in 90 seconds.

Nine Wooldridge Terra-Cobras were also brought in for excavation on some of the harder cuts. Two Allis-Chalmers HD-14C pusher tractors and two Caterpillar D8's were used to help these machines load. In addition, an HD-14C-drawn ripper was used ahead of this equipment to break the ground.

Two Caterpillar No. 12's and one Galion motor grader were used to maintain haul roads and keep the fills leveled. A water wagon with a 1,000-



C. & E. M. Photo
Scrapers, pusher tractors, Euclids, and a ripper are shown near the bottom of a heavy cut on the Northern Pacific railroad-realignment contract near Almont, N. Dak.

gallon tank was brought in to add moisture when it was needed, and a Northwest 80-D with shovel and dragline equipment was also used to load the few spots where rock was found.

Cut sections on the eastern half were also sloped down as directed, to a bot-

tom width of 40 feet. The slope varied, depending on material. In much of the formation, slopes would stand on 1 to 1, but certain sections were flattened beyond this so that snow would blow out and snow fence would not be

(Concluded on next page)

FLINK SELF FEEDING SPREADER

Faster-Safer-Cab-Controlled!

- Enables you to get icy spots covered faster
- Speed to danger spots, start spreading without stopping truck
- Finish spreading—speed on to next spot without stopping truck
- Operated entirely by driver with clutch control in cab
- Spreads all granular materials up to 1", wet or dry
- Spreads forward or backward—full or half width of street
- Does not limit use of truck—won't interfere with dumping
- Attaches to truck as a tailgate, off in 5 min.

ICE CONTROL
PASS WITH CAUTION

For literature and name of our distributor nearest you, write

Sand-Chip Attachment

The ideal machine for seal coating, road re-surfacing, dust control. Trouble-free, no working parts to attachment.

THE FLINK COMPANY, Dept. 674, Streator, Ill.



Courtesy Pittsburgh Hockey Club

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Phone: Milrose 5-7704-S-A

Big Dirt-Moving Job For RR Line Change

(Continued from preceding page)

needed.

Where fill was placed, the top width of the finished roadbed was 23 feet. The roadbed was built slightly full to allow for some settlement, but the concentration of rubber tires on this relatively narrow fill secured very good compaction. Equipment drivers had orders to vary their daily trips so the tires would pass over a different part of the fill each time. This prevented the establishment of well worn haul roads as such, and distributed the benefit of compaction over more of the fill.

Personnel

On the Guthrie contract, H. A. Griffis was Superintendent, and W. G. Ashworth and K. F. Gnos were the Resident Engineers. R. G. Peterson was the Superintendent on the eastern half of the job, aided by Assistant Superintendent R. C. Everhart. The Foley and Marsch-Peterson job also began on April 1, but because of the smaller amount of earth work this contract was finished before the work on the west half.

Bernard Blum is Chief Engineer for the Northern Pacific Railway. D. H. Shoemaker, Assistant Engineer, was in direct charge of the field work, and the final location of the roadbed was due largely to a survey he made in 1945.

When the railroad is finished, a siding will be built for Almont's grain elevators on the new line about 8 miles north of the present town. The new railroad location will also cut travel time between Kurtz and New Salem by 30 minutes for the ponderous freight trains which have rumbled past Almont's grain elevators for half a century.

Rust-Stopping Paint Matches Equipment

Both contractors and highway department officials will be interested in Totrust, an industrial paint made by The Wilbur & Williams Co. The product is described as deadly to rust on exposed metals in buildings, fences, equipment, and the like.

Plain Totrust is an oil paint that can be applied over rusted or damp surfaces, covering 800 to 1,200 square feet per gallon, W. & W. says. It penetrates rust pits and scars, surrounding the corroded particles and sealing them off to prevent further harm to the metal. The paint is supplied in black, white, clear, red, light gray, olive green, machine gray, and (under the name Totallume) aluminum.

Totrust heavy-duty enamel is used for extreme resistance to weathering. Put on over Totrust primer surfacer, this paint is said to provide a durable, high-gloss, enameled finish. It dries in 3 to 4 hours, and a gallon covers 600 square feet. Totrust enamel is supplied in black and white, and in twelve colors

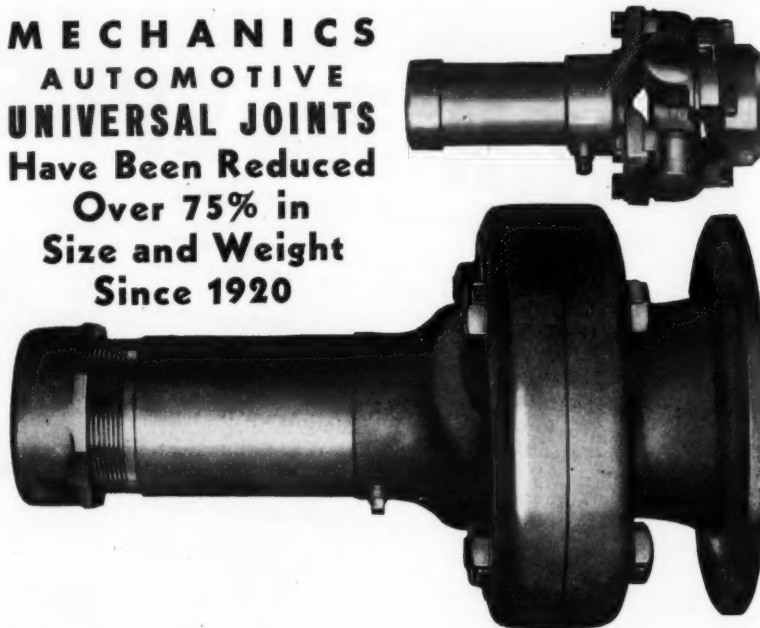


C. & E. M. Photo
An Adams 48-inch elevating grader, pulled by an Allis-Chalmers HD-14C tractor, is shown loading a bottom-dump Euclid on the Foley contract.

to match the original finishes of contracting machinery.

You can obtain full details about the two Totrust paints, together with color

**MECHANICS
AUTOMOTIVE
UNIVERSAL JOINTS
Have Been Reduced
Over 75% in
Size and Weight
Since 1920**



Have the Joints in Your Product Kept Pace with Progress?

Back in 1920, MECHANICS introduced the "Oil-Tite" universal joint — a vast improvement over the joints then in use.

Since then, MECHANICS has made many improvements — that have helped make universal joints smaller, lighter, of greater power-transmitting capacity, longer lasting, and requiring far less lubricating and servicing attention.

If long, dependable, trouble-free operation of universal joints is important to purchasers of your machines, it will pay you to investigate the advantages of MECHANICS design and construction.

Let our engineers show you how MECHANICS (Lifetime or Once-a-Season Lubricated) Roller Bearing UNIVERSAL JOINTS will improve the competitive position of your products.

MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2026 Harrison Ave., Rockford, Ill.

**On most jobs
When
Excavating is
Necessary**

The OWEN BUCKET Co.

6030 Breakwater Avenue Cleveland, Ohio

Branches: New York Philadelphia Chicago Berkeley, Cal.



You'll most likely come face to face with one or more Owen buckets, should your travels take you to an excavating job.

The reason why is most simple, for consistent superior bucket performance by Owens is responsible for their widespread use and acceptance.

Bring your equipment catalog files up to date NOW by requesting your copy of the latest Owen Catalog.



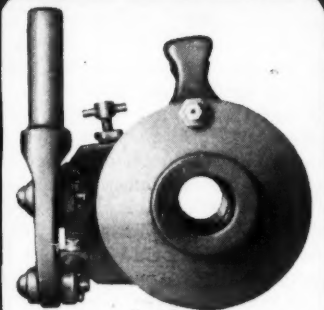
sheets, by writing The Wilbur & Williams Co., Greenleaf and Leon Sts., Boston 15, Mass.

New Position for Leece In Gardner-Denver Sales

G. V. Leece, Vice President of Gardner-Denver Co., has been appointed General Sales Manager for the company, which he joined in 1922. For the past two years his position has been that of Vice President in charge of the Export Division, with offices in New York City.

Mr. Leece, who is also a Director of Gardner-Denver Co., will now be located in the company's plant at Quincy, Ill.

*It's All in
the HOLE!
—of the
Simplex Jenny*



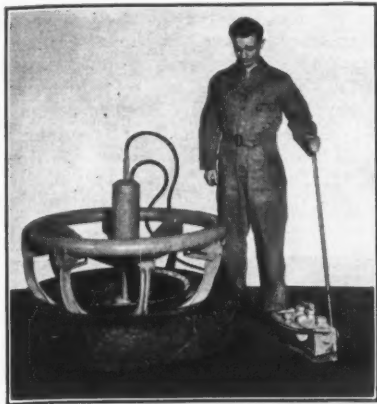
Simplex Jenny: capacities 30, 60, 80 and 100-tons. Center hole 1 1/8" to 3 1/8" diameter.

Looking down through the Center Hole of the Simplex Jenny Center Hole Hydraulic Puller, you can readily see why this compact unit enables one man to pull, push or lift as much as many men working with old methods. Shaft slipped through center hole is readily clamped, bolted or lugs welded on to provide back up for ram — reducing the time required for numerous tough, heavy jobs from hours to minutes. Ask for Bulletin 44-J.

Templeton, Kenly & Co.
Chicago 44, Ill.

SIMPLEX
WORLD'S MOST
COMPLETE
LINE OF
JACKS
LEVER
SCREW
HYDRAULIC

The Greatest Gift of All is Health
BUY CHRISTMAS SEALS
and Help Stamp Out Tuberculosis



A hand-operated hydraulic pump operates this model of the Presto tire demounter, manufactured by the Lee Engineering Co.

Pressure Demounting Of Tires From Rims

A device which removes tires from rims by means of hydraulic pressure is announced by the Lee Engineering Co., maker of Presto tire demounters. The demounters are made in six models ranging from hand-operated portable units, to motor-driven stationary units, to special machines large enough to remove 56-inch airplane tires.

The demounter exerts better than 60,000 pounds of pressure applied through eight tested steel fingers against the bead of the tire to remove the rim. The manufacturer states that there is no need for dangerous hammers, chisels, sledges, or tire irons.

The hydraulic action of Model A, a motor-driven model, is developed by a double-acting hydraulic cylinder. Pressure is achieved by a hydraulic pump driven by a 3-hp electric motor. The machine is complete with a thermal electric starting switch, wired and ready for connection to an electrical outlet.

The hand-operated types are of two kinds, mechanical and hydraulic. In the hydraulic type, the action is developed by a hand-operated hydraulic pump; this in turn operates a high-pressure hydraulic cylinder. No motors or compressors are required. The cylinder is double-acting and has a better than 60,000-pound capacity. In the mechanical models, pressure is applied with a screw-type handle, operating on a thrust roller bearing. No motors, compressors, or jacks are needed.

Further information may be obtained by writing to the manufacturer at 505 Central Ave., Pawtucket, R. I. Mention having seen this report in CONTRACTORS AND ENGINEERS MONTHLY.

Hydraulic Drill Jib

Drift and tunnel jobs are speeded up by the flexibility of the Hydro Drill Jib, Sullivan Division of Joy Mfg. Co. says in its bulletin describing this hydraulically controlled unit. The jib features remote control of the drill and long drill feed, in addition to its hydraulic pump.

The Joy Mfg. Co. is located in the H. W. Oliver Building, Pittsburgh, Pa. They will be glad to tell you more about the drill, and send you Bulletin 87-D.

Improved Timber Saws

A new and improved Titan timber saw is now available from Mill & Mine Supply Inc. The 10-hp Model E weighs slightly under 100 pounds when complete. The Model E will give maximum performance with a cutter bar up to 8 feet in length, according to the manufacturer.

The engine is a 2-cylinder simultaneously firing type, with an automotive carburetor and a flywheel magneto of standard design. The clutch is a perfected self-adjusting type, no thrust loads being exerted on either crankshaft or transmission.

The manufacturer states that a special feature of the cutting chain eliminates packing of sawdust in the cutter-bar groove; this prevents chain jumping. A new and improved chain is also announced which is said to cut faster and on less power than its predecessors. It can be refilled right on the saw, and fits any Titan timber saw without changes. The cutter bar is made of high-grade, light-weight, heat-treated steel. Its reversible feature enables the operator to utilize both sides, thus doubling its life. The bars can be used both horizontally and vertically.

For further information and price lists, write to the manufacturer, Mill & Mine Supply Inc., 2700 Fourth Ave., So., Seattle 4, Wash., mentioning this item in CONTRACTORS AND ENGINEERS MONTHLY.

Concrete-Floor Paint

A new Rubbermastic concrete-floor paint, applicable to shop and garage floors, has just been announced. Made from 100 per cent gilsonite, it is designed to dry tack-free in four hours to an enamel-like finish.

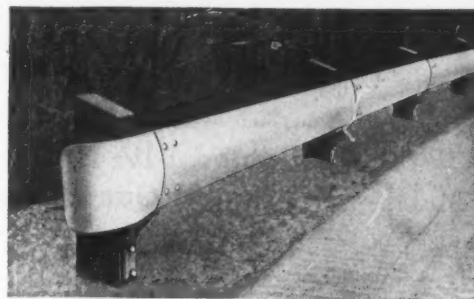
The Los Angeles Division of Tiz-Nu Corp., at 673 Coronado St., says its product will eliminate the necessity of etching or priming; that it will do away with saponification troubles; and that it is 100 per cent waterproof. Flushing the floor with water after the paint is dry causes a flint-like hardness. The paint is said to resist acid, alkali, heat, electrolysis, and the abrasive effects of dirt and sand.

As gilsonite is available, the firm explains it can put the paint on the market for immediate sales.

Tractor Equipment Firm

A new company, Tractomotive Corp., has been formed to manufacture equipment for industrial wheel and crawler tractors. V. M. Dobeus, formerly Chief Engineer, Springfield Works, Tractor Division of Allis-Chalmers Co., is President. Paul B. Cochran, formerly General Manager of Buckeye Traction Ditcher Co., is Vice President and Treasurer.

The company is an Illinois corporation with Chicago offices at 228 No. LaSalle St. The plant and engineering department is now operating at Findlay, Ohio, with offices at 101 W. Sandusky St.



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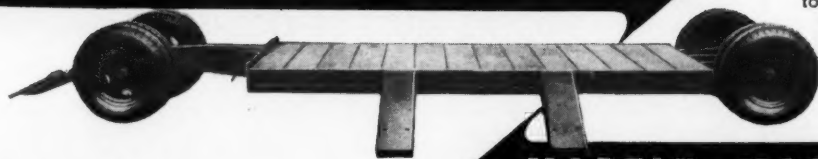
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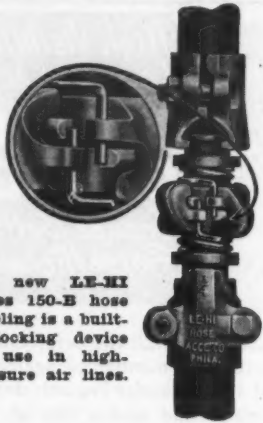
Ease of loading, dependability and economical operation are three Martin CARRYHAUL Trailer characteristics which make them the leaders in the field. Regardless of your hauling job, there's a proper size Martin CARRYHAUL Trailer to do it for you safely and economically.

Keep On

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DON'T SKIMP!



The new LE-HI Series 150-B hose coupling is a built-in locking device for use in high-pressure air lines.

New Safety-Locking Air-Hose Couplings

A new universal-type hose coupling with a built-in locking device is now available. It is designed to provide maximum safety for workers using high-pressure air-hose lines. This patented device is said to eliminate the danger of accidental uncoupling of hose lines even under the roughest service conditions, yet to permit instant and easy engagement or disengagement of couplings when desired.

The manufacturer, Hose Accessories Co., explains that no tools, nails, cotter pins, or other gadgets are needed in the operation of this coupling, the LE-HI Series 150-B. It is fully interchangeable with other universal-type hose couplings made to accepted standards, and will lock in engagement with such units. It is constructed entirely of bronze and is said to be resistant to rust and corrosion.

Further information may be obtained from the Hose Accessories Co., 2702-V No. 17th St., Philadelphia 32, Pa.

Concrete Shrinkage

Shrinkage of concrete and mortar, its important influence on durability and serviceability, the principal factors affecting it, and its control and elimination, are discussed in the second edition of the 33-page booklet, "The Action of Embeco in Concrete and Mortars".

The booklet explains the principle of using Embeco, a specially prepared metallic aggregate, to control shrinkage. It describes the use of Embeco for machinery and heavy-equipment grouting, cement-gun work, and patching and repairing concrete. Charts, graphs, and

technical data are included.

The booklet is released by the manufacturer of Embeco, The Master Builders Co., 7016 Euclid Ave., Cleveland 3, Ohio.

Air-Cooled 1-1/2-Hp 37-Pound Gas Engine

For installations that require compact power, the Clinton Machine Co. is now offering a gasoline engine weighing about 40 pounds. The 4-cycle unit is air-cooled, and has a 1 to 1-1/2-hp rating, producing from 2,000 to 3,600 rpm. It stands 16 inches high.

Known as the Clinton 700, the engine uses a rope starter, with a kick starter as optional equipment. The crankshaft turns counterclockwise and has an extension that is provided with a keyway for mounting a pulley or coupling. Gear reductions of 6 to 1, and direct-mounting crankcases are also supplied if desired.

You will receive all details about the Clinton 700, together with specification sheets, if you write the Clinton Machine Co., Clinton 1, Mich., and mention this notice.

New Office for Wheelco

Wheelco Instruments Co., Chicago, manufacturer of industrial measurement and control instruments, has announced the opening of a new district sales and service office at 107 So. Capitol Ave., Indianapolis 4, Ind. This office, under the direction of John E. Anderson, will serve the greater portion of Indiana, western Ohio, and Kentucky.

The Indianapolis office will control a sub-office in the Temple Bar Building in Cincinnati, Ohio, with L. A. Wallingford as District Manager. Walter A. Jones, Service Engineer, will assist Mr. Anderson in Indianapolis.

Steel Floors for Bridges

A 40-page catalog on open steel flooring for bridges has just been completed by Kerlow Steel Flooring Co. It contains the latest engineering information on the design and selection of grating and stringers in accordance with the 1944 Standard Specifications of Highway Bridges of the American Association of State Highway Officials.

The catalog explains the increasing importance of this type of bridge flooring. It describes the various Kerlow de-

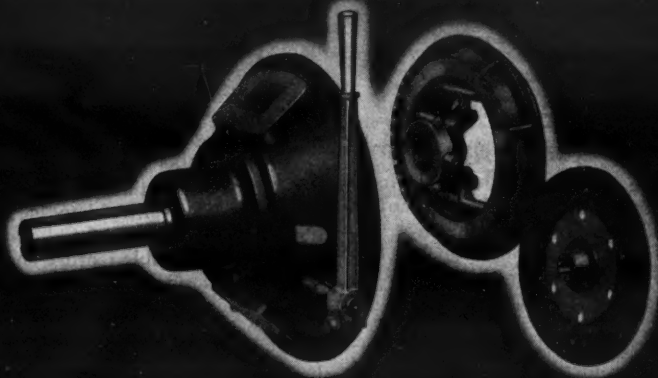
signs and their applications for open flooring and filled slabs; it includes dimension charts and complete specification, selection, and installation data for each design.

Also included are details on Kerlow splicers, drain grates, trench grates, expansion joints, sidewalks, safety steps, etc. Several dozen photographs show

Kerlow steel flooring installed in various types of bridges. There are also selection charts for grating bars, cross beams, and stringers, and detailed drawings of each of the Kerlow designs.

Copies of this catalog can be obtained by addressing Kerlow Steel Flooring Co., 222 Culver Ave., Jersey City 5, N.J. Mention this notice.

ROCKFORD



POWER TAKE-OFFS

SELF CONTAINED UNIT

WIDE RANGE OF SIZES

CONSERVATIVE RATING

ROLLER BEARINGS

FINE ADJUSTMENT

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Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION

314 Catherine Street, Rockford, Illinois, U.S.A.

NOTICE TO CONTRACTORS

Before the end of 1946, the Sewerage and Water Board of New Orleans, Louisiana, expects to call for bids for the construction of a water main consisting of the following:

- 14,350 lineal feet of 48-inch cast iron pipe, or of steel pipe of the same outside diameter.
- 9,400 lineal feet of 42-inch cast iron pipe, or of steel pipe of the same outside diameter.
- 11,650 lineal feet of 36-inch cast iron pipe, or of steel pipe of the same outside diameter.
- 6,100 lineal feet of 30-inch cast iron pipe, or of steel pipe of the same outside diameter.
- 4,650 lineal feet of 24-inch cast iron pipe.

Installation of the whole main, including the furnishing of the 24-inch cast iron pipe, will be under one contract. Cast iron pipe and/or steel pipe of 30-inch size and larger, and valves—both gate and check—will be purchased under separate contracts. . . . The installation of the water main will be in city streets, from the purification plant to the other side of the city; and, is to be completed within twelve months after the delivery of the pipe.

BIDDERS MUST BE LICENSED UNDER LOUISIANA LAW

Since bidders on the installing contract are required to be licensed under Louisiana Law before they can be issued plans and specifications for making proposals, all contractors who may be interested in bidding on the above work are invited to communicate with the General Superintendent, Sewerage and Water Board of New Orleans, 526 Carondelet St., New Orleans 12, La., who will furnish full information as to the work to be done and the qualifications required of contractors.

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- The bucket leader is Wellman — pioneer in building buckets of welded rolled steel! Gives you longer, better service at lower cost on all types: Multiple Rope, Power Arm, Dragline, Power Wheel.
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Army Starts Vast Hydraulic Research

The U. S. Army's Corps of Engineers is undertaking to build the largest hydraulic model ever attempted by man. Some 200 acres near Clinton, Miss., have been selected as the site for the experiment, according to Secretary of War Robert P. Patterson, in a speech made at Vicksburg, Miss.

Within the site chosen, all main streams of the Mississippi River watershed—an area extending from Montana to Texas, and from the Rocky Mountains to Texas—and all variations of terrain from sandbar to mountain mass, all existing and proposed flood-control reservoirs, as well as levee systems, dikes, floodwalls, floodways, and other pertinent works, will be produced to scale. "Nothing like it," said Mr. Patterson, "has ever been attempted anywhere by government or industrial enterprise."

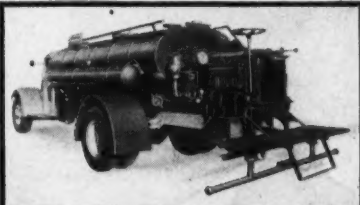
By capsuling 1,250,000 square miles of drainage area, contained in 28 states, into a field laboratory, the Corps of Engineers hopes to learn how to harness the rivers of the Mississippi basin for the benefit of the American people. The lower half of the project is expected to be completed and in operation within a year. The entire project is scheduled to be ready in two to three years.

The U. S. Waterways Experiment Station in Vicksburg, where Mr. Patterson made his speech, is an agency of the Corps of Engineers. It is devoted to the analysis by experiment of problems arising all over the U. S. from the action of water and soil, although it was originally established to plan Mississippi flood control.

The Secretary concluded by stating

that this down-to-earth concern with the raw material of our country—its soil and water—is typical of the peacetime Army as an agency of the people's security. It seeks to protect the nation against the ravenous forces of unbridled nature.

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Contractors *and* Engineers Monthly

Pair of **TOURNAPULLS** deliver 32 loads per hr. on 100' haul for farm-to-market road

Stearns County's plans for a new farm-to-market road between Brooten and Padua, Minnesota, called for a 26' top, 4-to-1 slope, with 3½' ditch . . . and involved moving 124,000 yards of clay loam over hauls ranging from 100' to ½ mile. Tournapulls handled most of the yardage for Johnson Construction Co., Litchfield, Minn., contractor . . . chalked up a high production record even on the shortest hauls. For instance . . .

On a 100' haul, loading out of ditch, hauling cross road and spreading on the other side, two of Johnson's Tournapulls delivered 32 loads per hour. Job records show Tournapulls gained on crawler equipment on all hauls, saved time, fuel and upkeep. Abe Johnson, a company partner says, "Tournapulls are now on another road job . . . beating the good output record they made here".

You can lower your dirtmoving costs with high-speed, rubber-tired Tournapulls . . . in all scraper materials . . . on short and long hauls . . . under any conditions. Ask your LeTourneau Distributor to help you estimate Tournapull production on your roadwork. He has facts and figures to show you.

▲ Tournapulls heap clay loam to spring pipe cutting 3½' drainage ditch for farm-to-market road.

▼ After cut, Tournapulls make turn onto fill for spread . . . 2 rigs delivered 32 loads per hour on this 100' haul.

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